

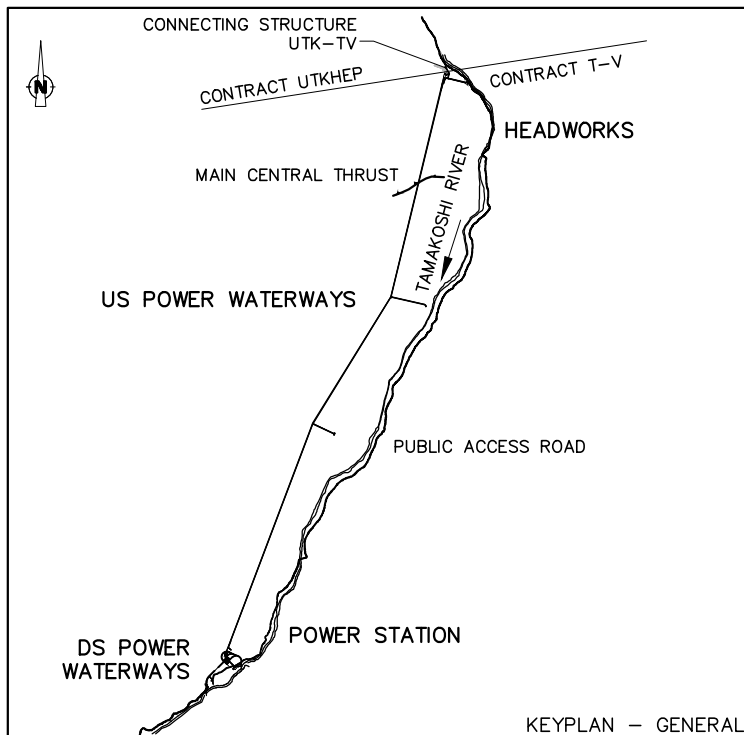
NOTES:

1. ALL DIMENSIONS ARE IN METERS [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. CO-ORDINATES BASED ON NATIONAL GEODETIC NETWORK SYSTEM (EVEREST 1830).
4. TEMPORARY ROCKPILLAR AT CONTRACT LIMIT SHALL BE REMOVED AFTER ALL WORKS DOWNSTREAM FINALIZED.
5. AFTER REMOVAL OF ROCKPILLAR THE REMAINING ROCKSUPPORT INCLUDING CONCRETE LINING UPTO CONNECTING STRUCTURE UTKHEP-TV SHALL BE FINALIZED.

LEGEND:

- AZ AZIMUTH [°]
E ELEVATION
F FIX POINT

SCALE
-20 0 20 40 60 80 100 [m]
1:2000



KEYPLAN - GENERAL

Reference Drawings

Drwg. No.	Title

Revisions	Name	Date	Notes



TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY



CONSULTING ENGINEERS
BAD VILBEL, GERMANY

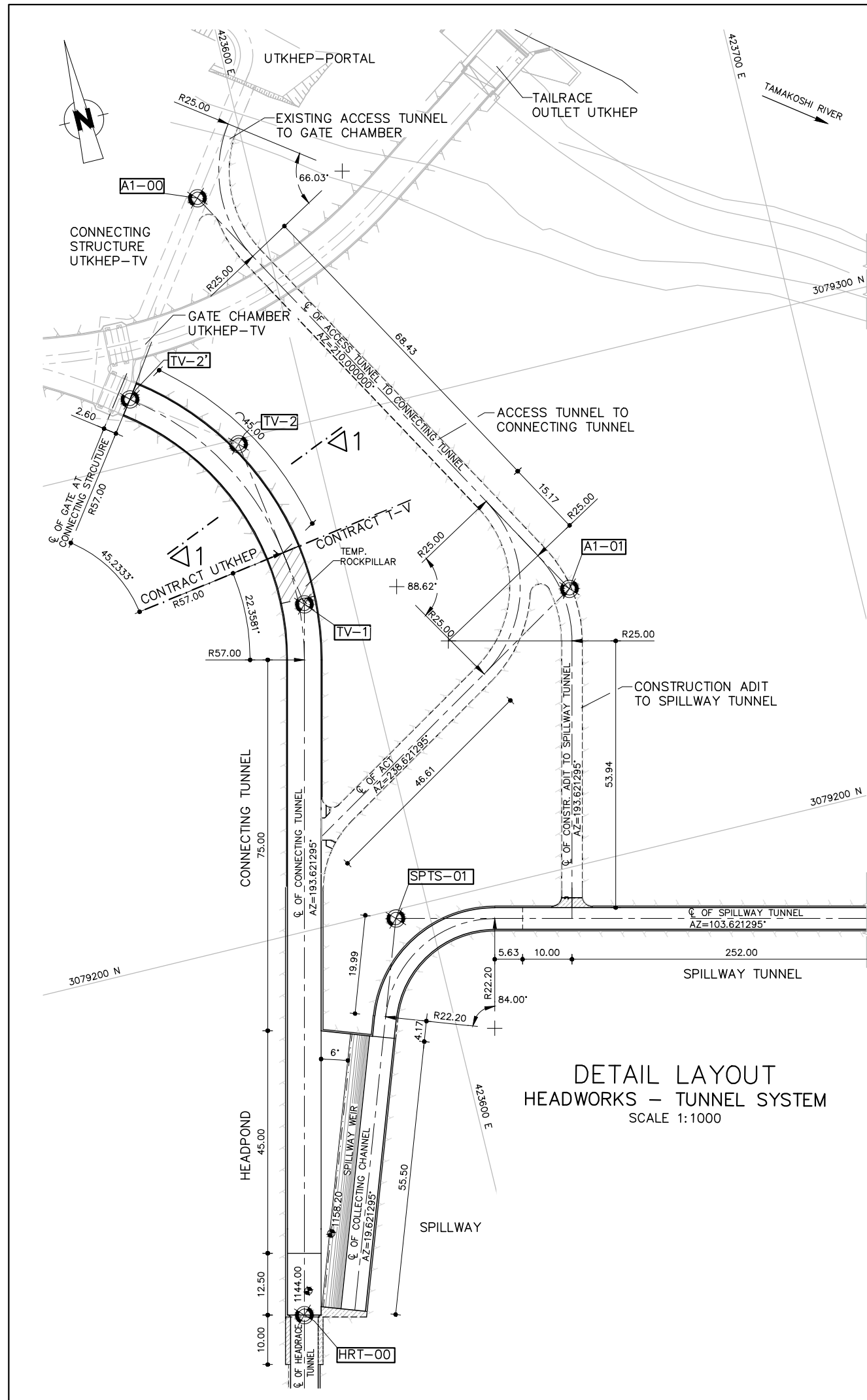
TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

Prepared	Name	Date	DETAILED DESIGN
Drawn	B. Khadka	31.07.17	HEADWORKS
Checked	Roloff		HEADWORK STRUCTURES
Approved	Dr. Moeller		LAYOUT
Replaces Drwg. No: 31-00053-DD-4310-Y-0000_			
CAD- File No.:			
Scale A3: 1:2000			PROJECT DRAWING
Drwg. No.: 31-00053-DD-4310- Q 1200			REV. -

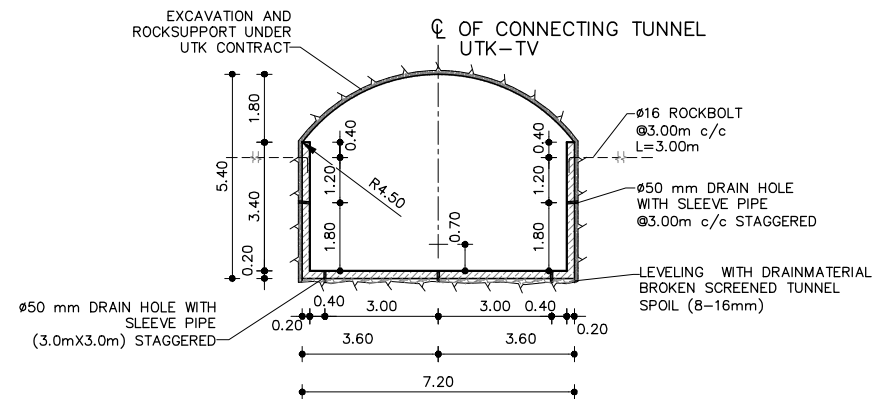
TABLE OF COORDINATES		
CO-ORDINATE POINTS	X-EASTING	Y-NORTHING
HRT-00	423556.333	3079124.674
TV-1	423590.190	3079264.395
TV-2	423584.872	3079299.000
SPTS-00	423910.622	3079121.344
SPTS-01	423593.226	3079198.255
A1-00	423588.497	3079349.284
A1-01	423643.037	3079254.817

LAYOUT
HEADWORKS
SCALE 1:2000

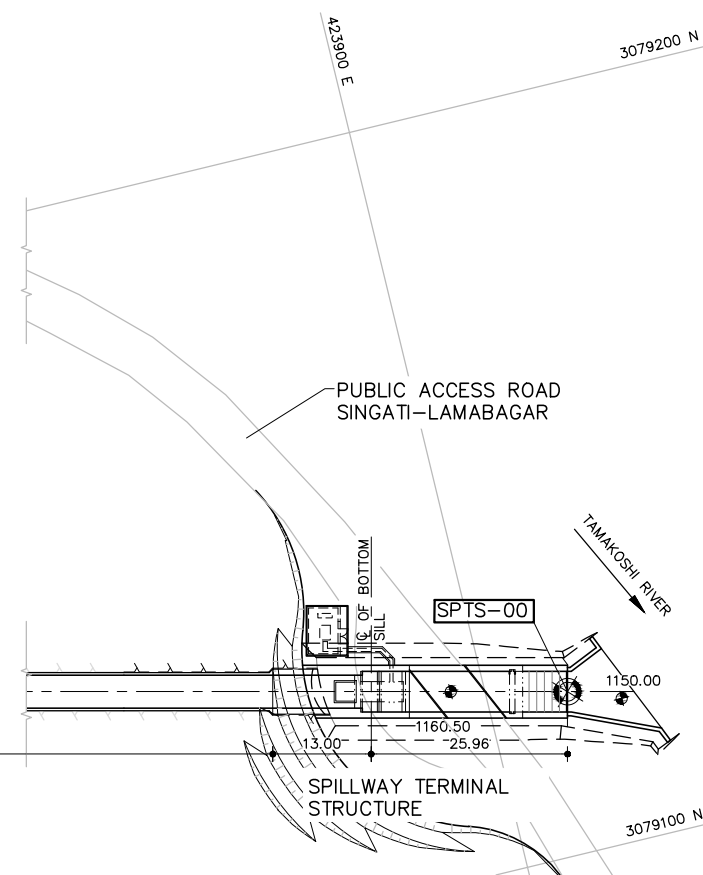
DRAFT STATUS:
13.09.2018



DETAIL LAYOUT
HEADWORKS – TUNNEL SYSTEM
SCALE 1:1000



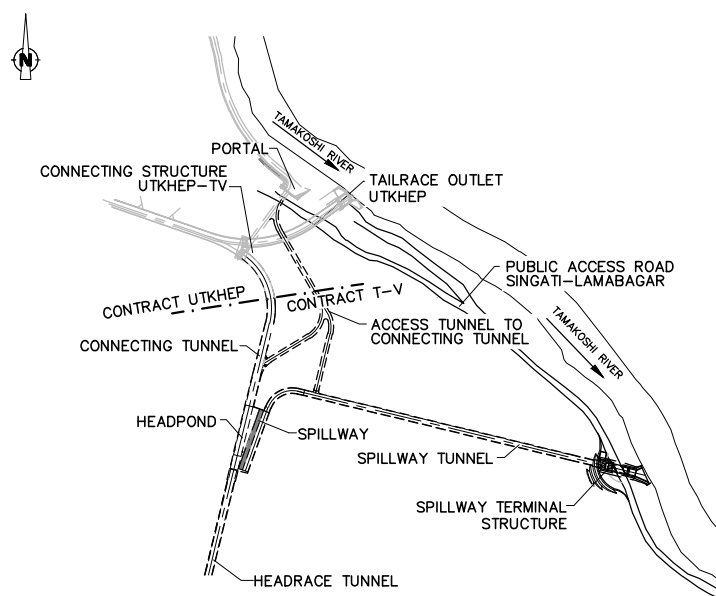
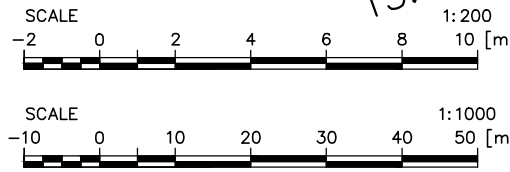
SECTION 1-1
CONNECTING TUNNEL UTK-TV
SCALE 1:200



- LEGEND:**
- AZ AZIMUTH [°]
 - E ELEVATION
 - FIX POINT
 - CONCRETE CLASS C1 – CONCRETE C25/30
 - CONCRETE CLASS F – BLINDING CONCRETE C12/15
 - CONSTRUCTION JOINTS
 - UNFINISHED TOP OF SLAB
 - FINISHED FLOOR LEVEL

- NOTES:**
- ALL DIMENSIONS ARE IN METERS [m] UNLESS OTHERWISE NOTED.
 - ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
 - CO-ORDINATES BASED ON NATIONAL GEODETIC NETWORK SYSTEM (EVEREST 1830).
 - FOR TEMPORARY ROCKPILLAR SEE NOTES ON DRAWING LAYOUT OF HEADWORKS.

DRAFT STATUS:
13.09.2018



KEYPLAN – HEADWORKS

Reference Drawings	
Drwg. No.	Title
31-00053-DD-4310-1200	HEADWORK, HEADWORK STRUCTURES, LAYOUT

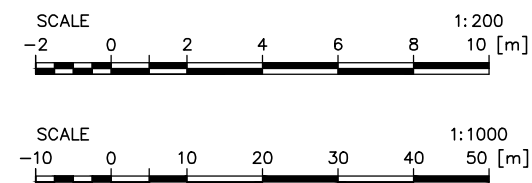
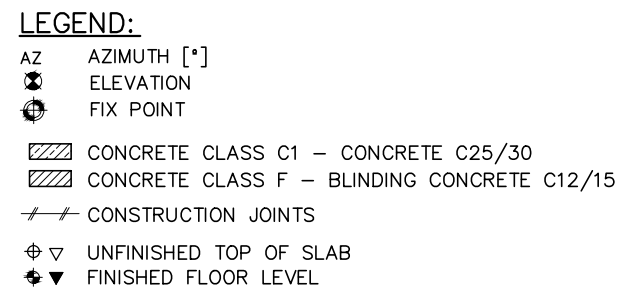
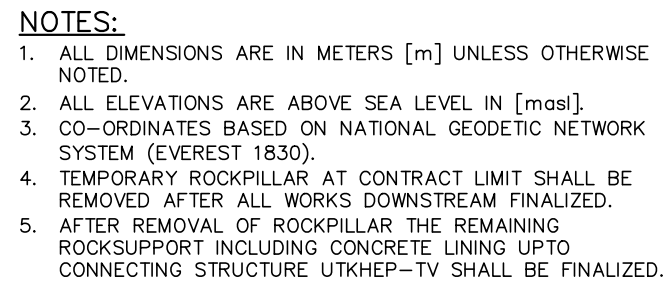
Revisions			
	Name	Date	Notes

TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY

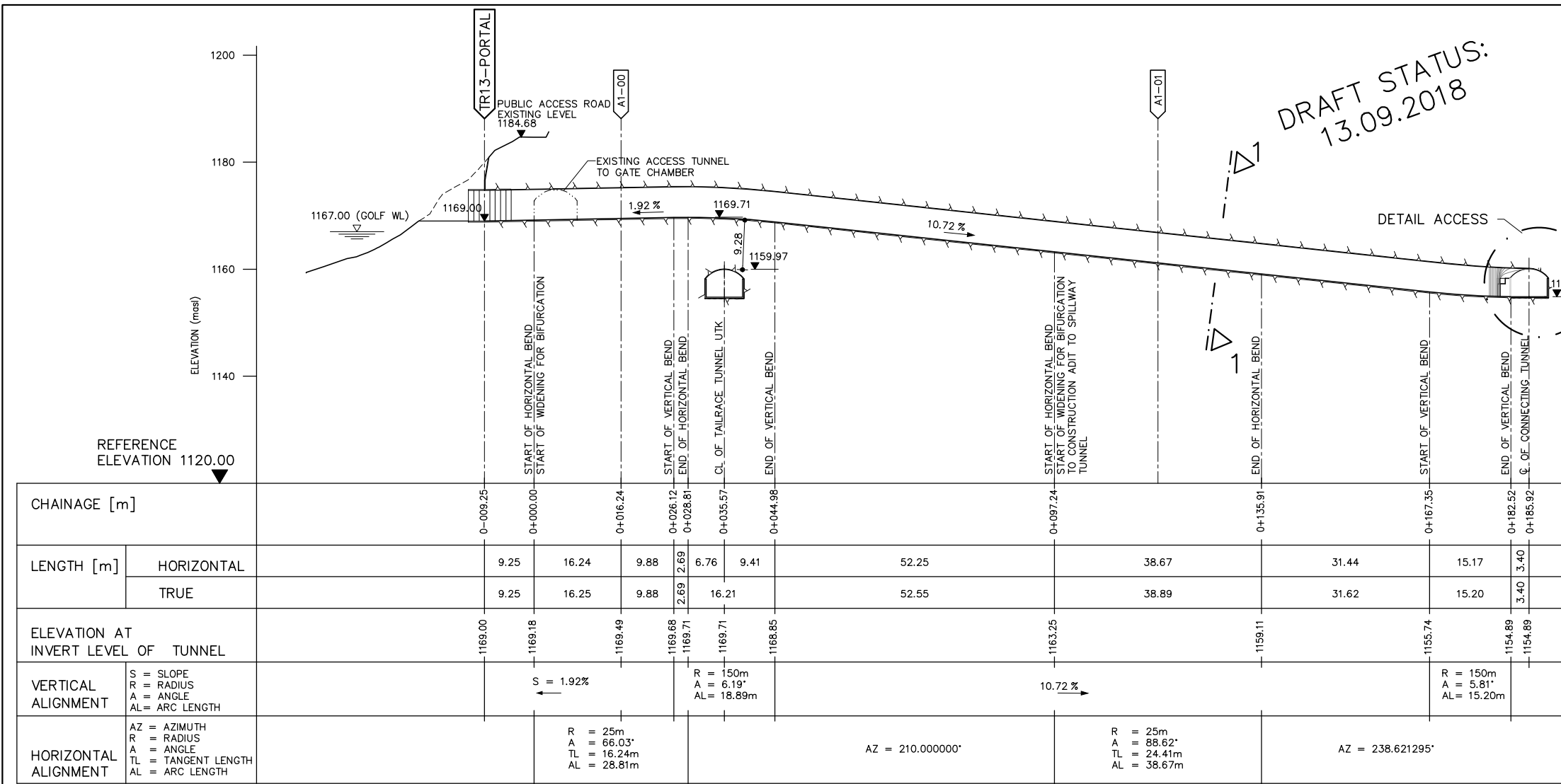
LAHMEYER INTERNATIONAL
CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT
DETAILED ENGINEERING DESIGN

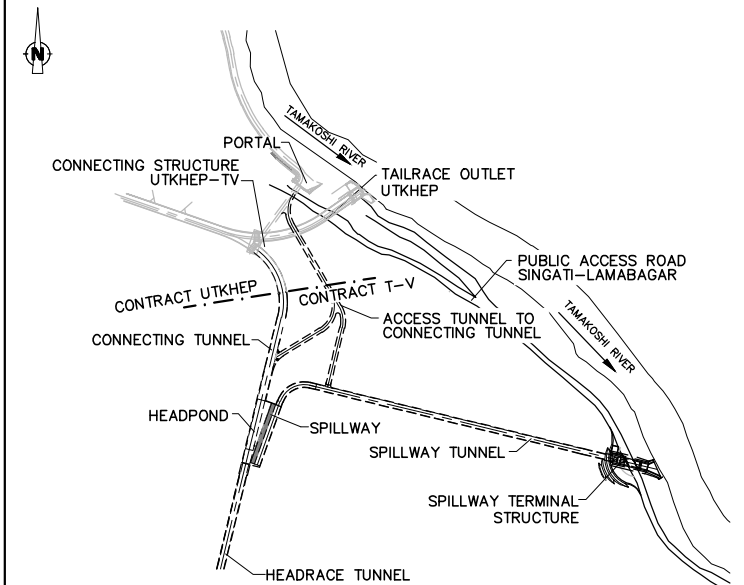
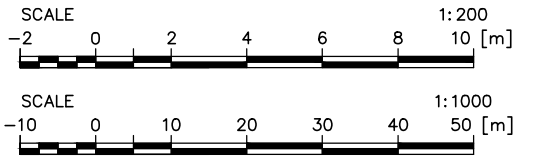
	Name	Date	DETAILED DESIGN		
Prepared	B. Khadka	31.07.17	<u>HEADWORKS</u> <u>HEADWORK STRUCTURES</u> <u>TUNNEL SYSTEM</u> <u>DETAIL LAYOUT</u>		
Drawn	B. Khadka				
Checked	Roloff				
Approved	Dr. Moeller				
Replaces Drwg. No: 31-00053-DD-4310-Y-0000_-					
CAD- File No.:			PROJECT DRAWING		
Scale A3: 1:1000/ 1:200			Drwg. No.: 31-00053-DD-4310- Q 1201		REV. —



Reference Drawings				
Drwg. No.		Title		
31-00053-DD-4310-Q1200		HEADWORK STRUCTURES – LAYOUT		
31-00053-DD-4310-Q1201		HEADWORK STRUCTURES – TUNNEL SYSTEM – DETAILED LAYOUT		
Revisions				



- NOTES:**
1. ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
 2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
 3. CO-ORDINATES BASED ON NATIONAL GEODETIC NETWORK SYSTEM (EVEREST 1830).



KEYPLAN - HEADWORKS

Reference Drawings	
Drwg. No.	Title
31-00053-DD-4310-Q-1201	HEADWORKS, HEADWORK STRUCTURES, TUNNEL SYSTEM, LAYOUT

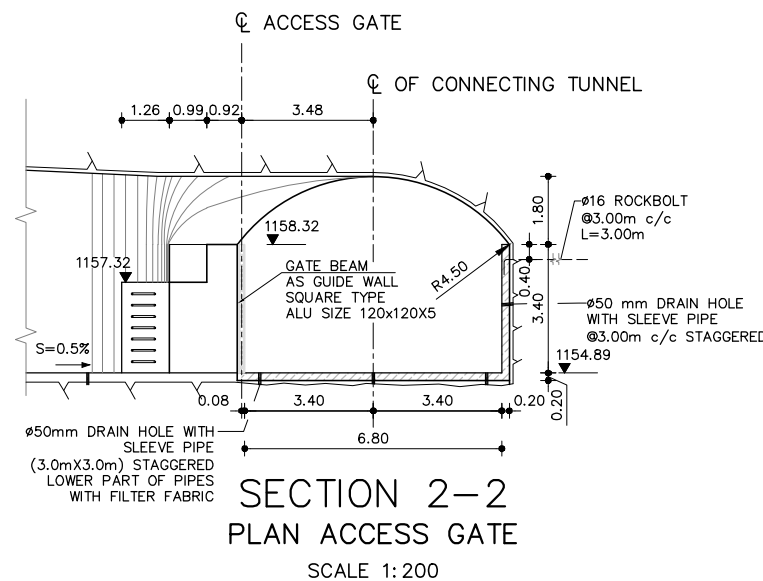
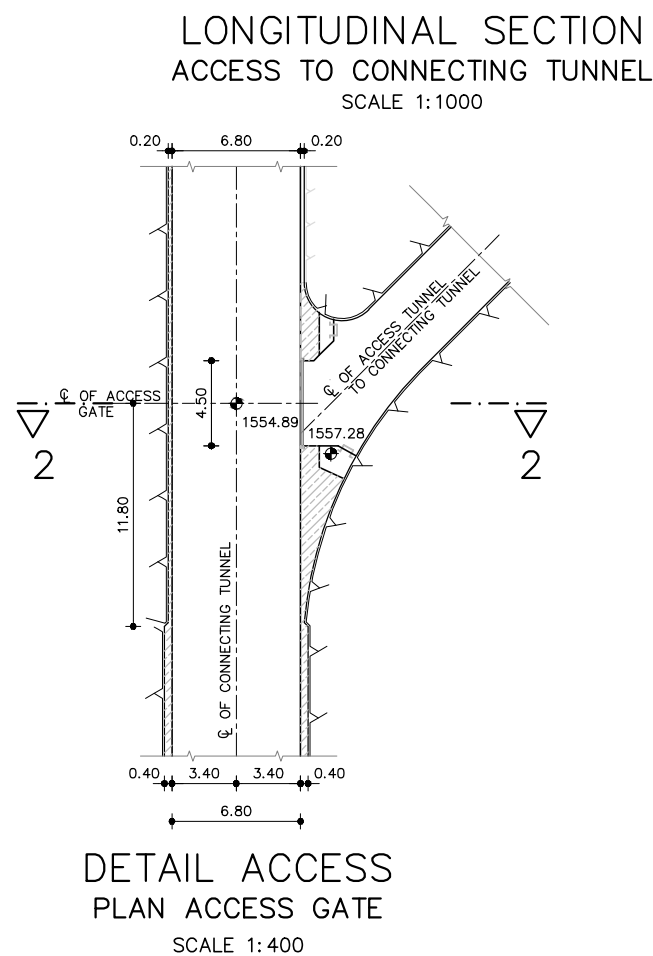
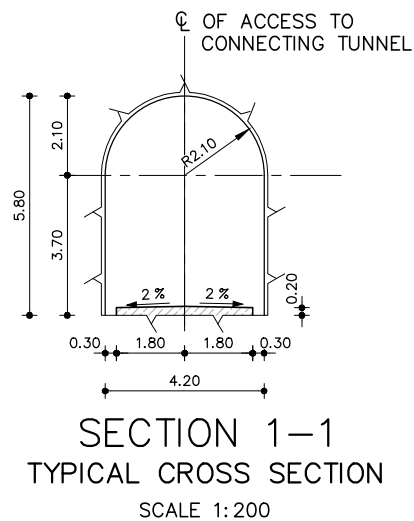
Revisions	Name	Date	Notes

TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY

LAHMEYER INTERNATIONAL
CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT
DETAILED ENGINEERING DESIGN

Name	Date	DETAILLED DESIGN
Prepared B. Khadka	31.07.17	HEADWORKS
Drawn B. Khadka		ACCESS TUNNEL TO
Checked Roloff		CONNECTING TUNNEL
Approved Dr. Moeller		LONGITUDINAL SECTION
Replaces Drwg. No: 31-00053-DD-4364-Y-0000_		AND DETAILS
CAD- File No.:		PROJECT DRAWING
Scale A3: 1:1000/ 200	Drwg. No.: 31-00053-DD-4315-Q 1215	REV. -

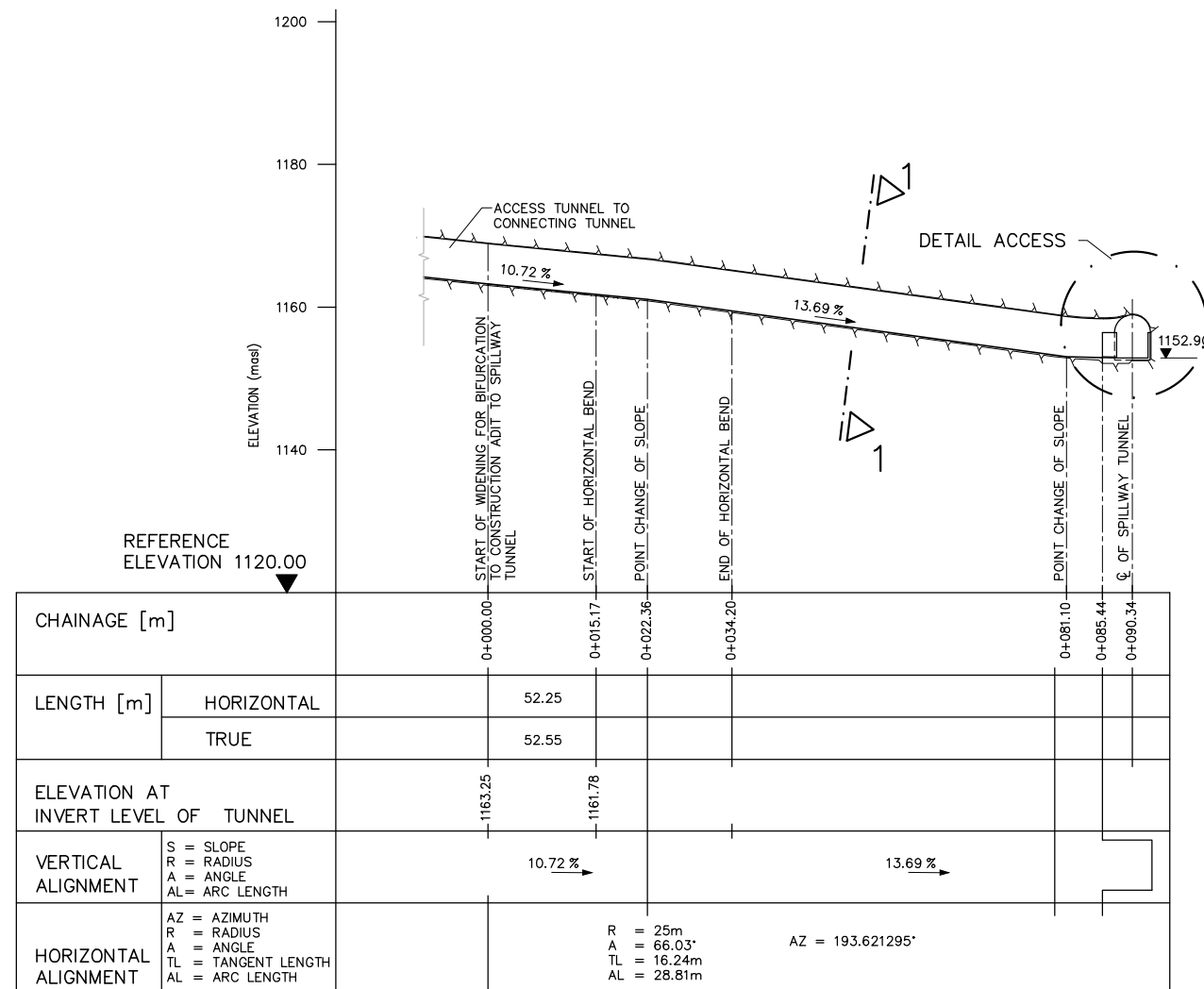


- LEGEND:**
- ⊕ ELEVATION
 - ⊙ FIX POINT
 - CONCRETE CLASS C1 - CONCRETE C25/30
 - CONCRETE CLASS F - BLINDING CONCRETE C12/15
 - CONSTRUCTION JOINTS
 - ⊕ UNFINISHED TOP OF SLAB
 - ⊙ FINISHED FLOOR LEVEL

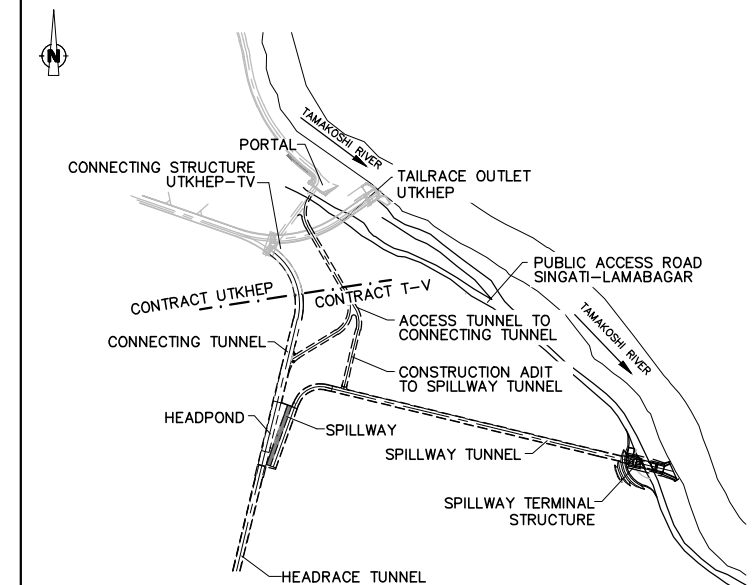
DRAFT STATUS:
13.09.2018

NOTES:

1. ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. CO-ORDINATES BASED ON NATIONAL GEODETIC NETWORK SYSTEM (EVEREST 1830).



LONGITUDINAL SECTION
CONSTRUCTION ADIT TO SPILLWAY TUNNEL
SCALE 1:1000



Reference Drawings	
Drwg. No.	Title
31-00053-DD-4310-Q-1201	HEADWORKS, HEADWORK STRUCTURES, TUNNEL SYSTEM, LAYOUT

Revisions	Name	Date	Notes



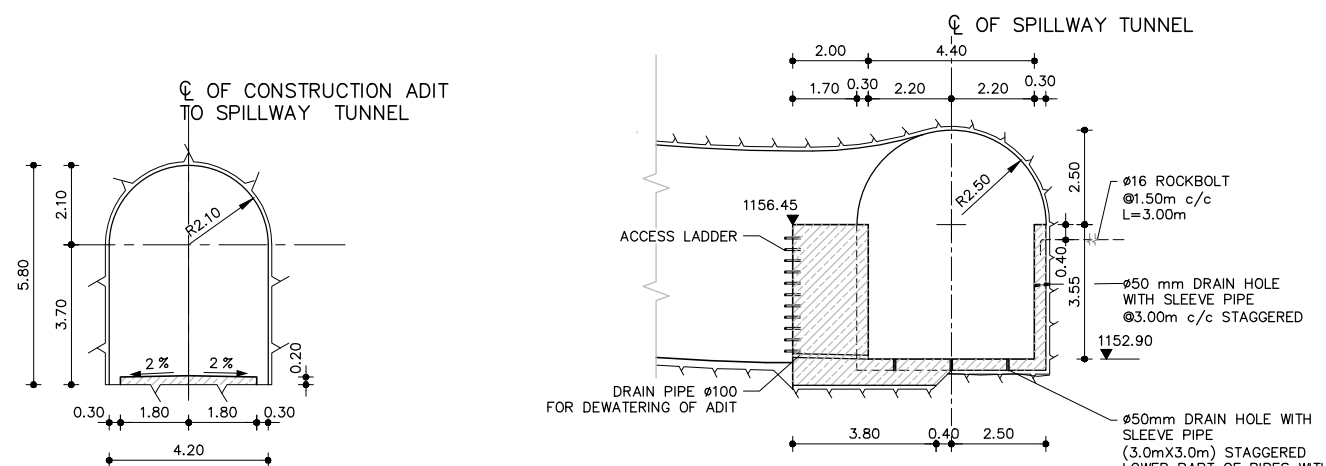
TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY



CONSULTING ENGINEERS
BAD VILBEL, GERMANY

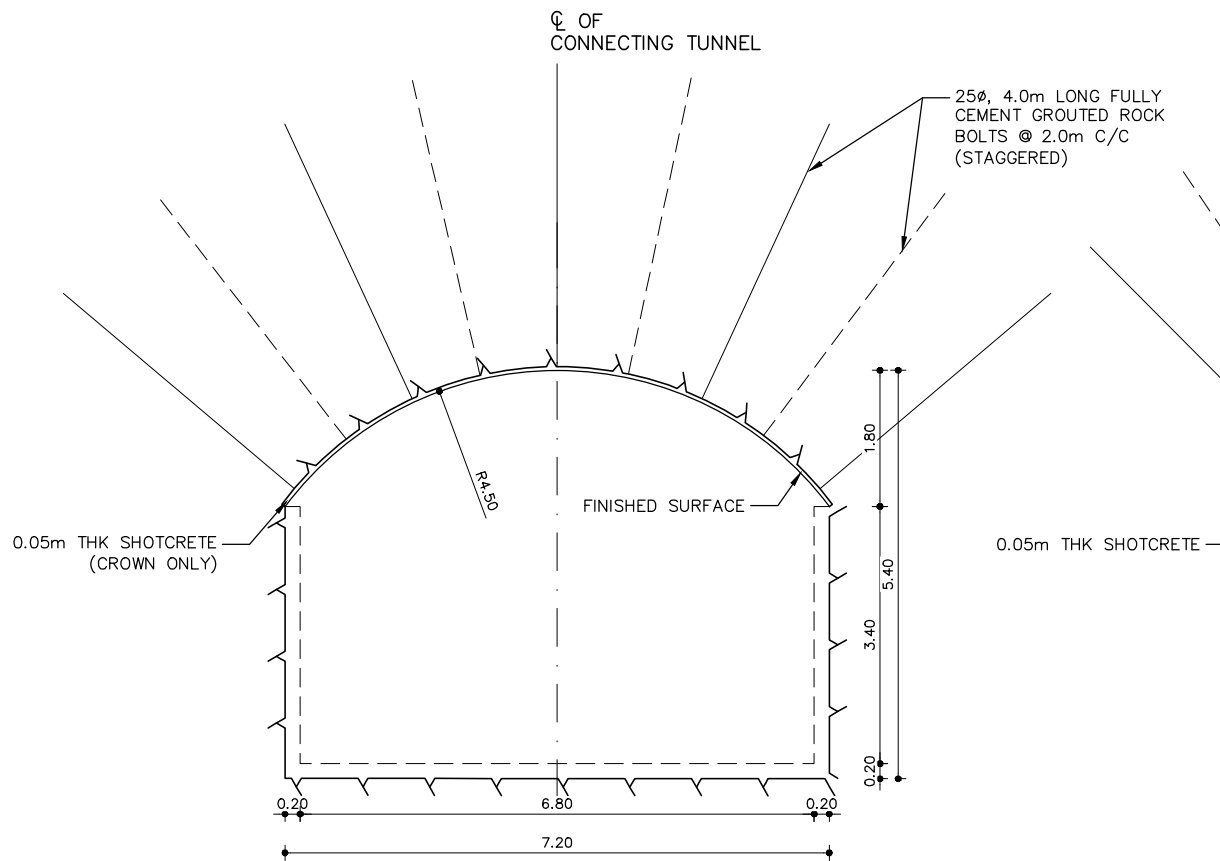
TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

	Name	Date	DETAILED DESIGN
Prepared	B. Khadka	31.07.17	HEADWORKS
Drawn	B. Khadka		CONSTRUCTION ADIT TO SPILLWAY TUNNEL
Checked	Roloff		LONGITUDINAL SECTION
Approved	Dr. Moeller		AND DETAILS
Replaces Drwg. No: 31-00053-DD-4364-Y-0000_			PROJECT DRAWING
CAD- File No.:			
Scale A3:	1:1000/ 200	Drwg. No.: 31-00053-DD-4315- Q 1216	REV. -

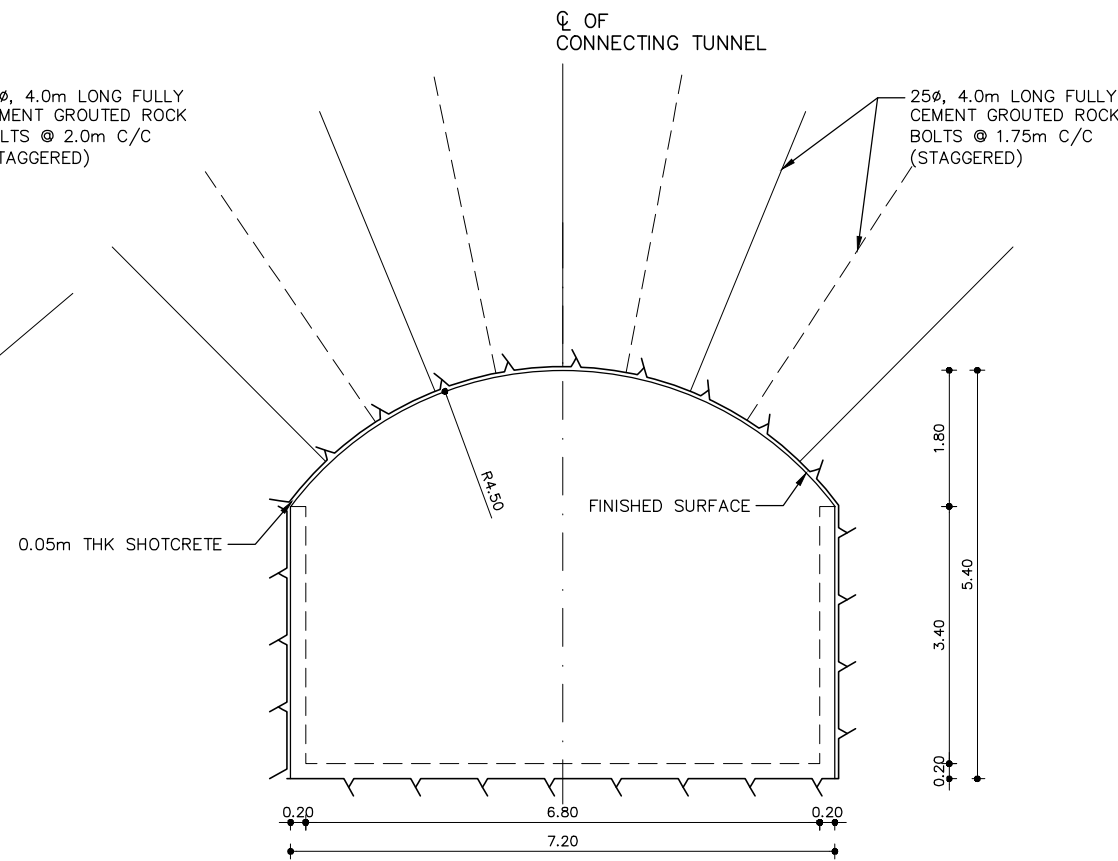


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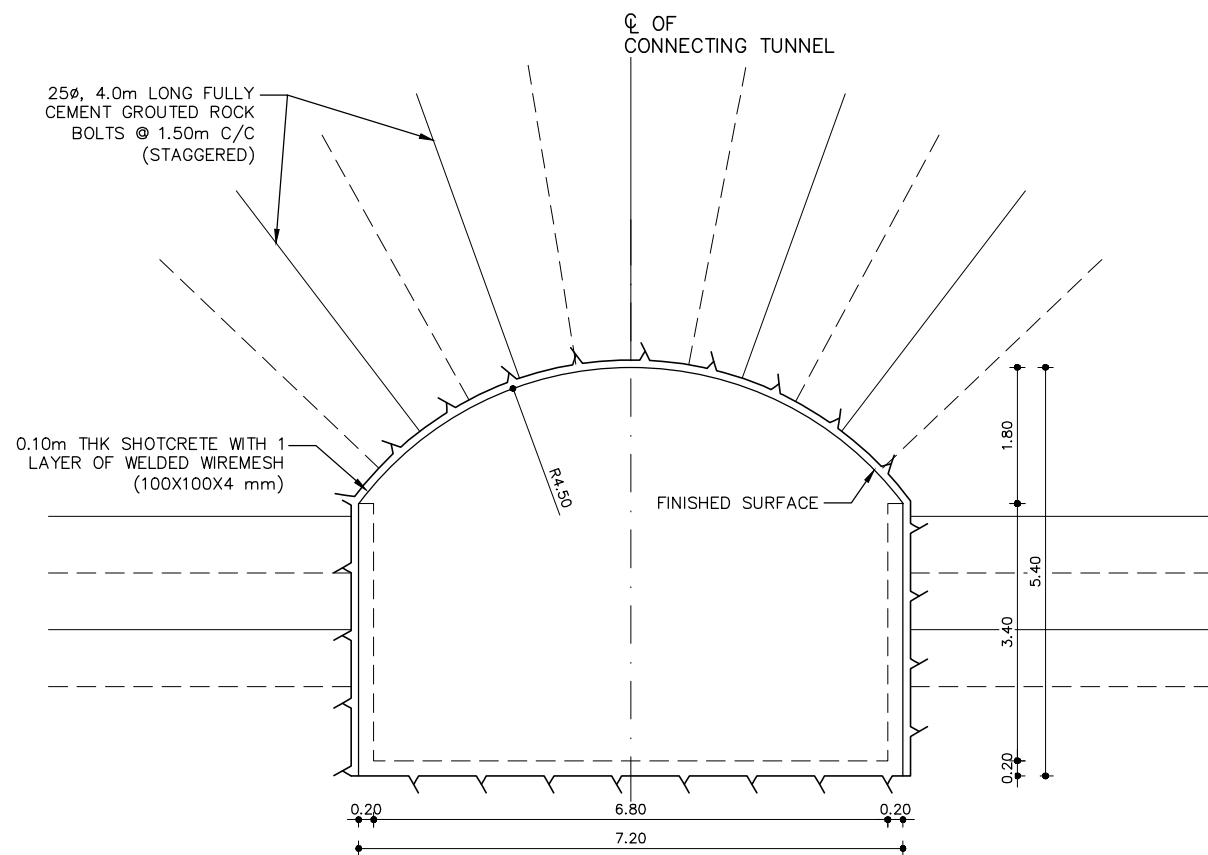
- ⊗ ELEVATION
- ⊙ FIX POINT
- ▨ CONCRETE CLASS C1 - CONCRETE C25/30
- ▨ CONCRETE CLASS F - BLINDING CONCRETE C12/15
- CONSTRUCTION JOINTS
- ⊕ ▽ UNFINISHED TOP OF SLAB
- ⊕ ▽ FINISHED FLOOR LEVEL



CONNECTING TUNNEL
TYPICAL DETAILS OF SUPPORT SYSTEM FOR ROCK CLASS II
SCALE 1:100



CONNECTING TUNNEL
TYPICAL DETAILS OF SUPPORT SYSTEM FOR ROCK CLASS III
SCALE 1:100



CONNECTING TUNNEL
TYPICAL DETAILS OF SUPPORT SYSTEM FOR ROCK CLASS IV
SCALE 1:100

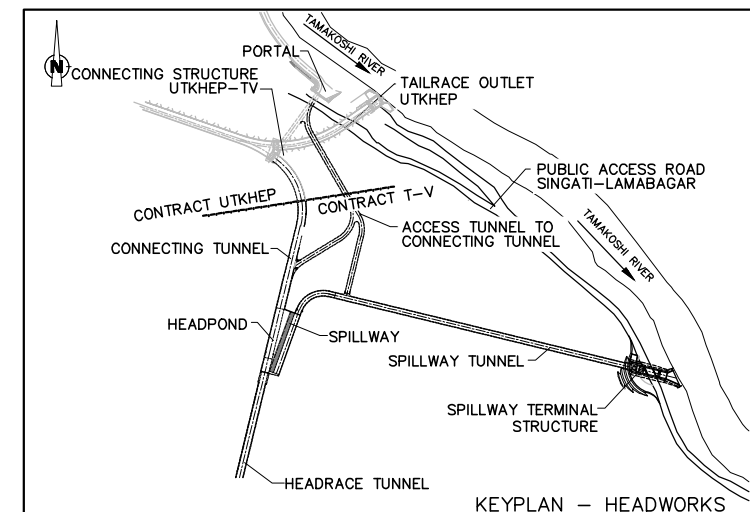
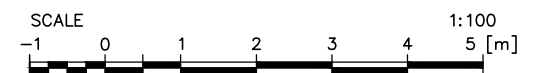
NOTES TO ROCK SUPPORT:

- ROCK BOLTS SHALL HAVE THE FOLLOWING CHARACTERISTICS:
 - DIA. 25 MM
 - YIELD STRENGTH 500 N/MM²
 - MAXIMUM TENSILE CAPACITY 213 KN
- THE SHOTCRETE MIX SHALL HAVE 28 DAYS OF COMPRESSIVE STRENGTH OF 35MPa.
- STEEL RIBS SHALL CONFORM TO IS:226-1975.
- AN ADDITIONAL LAYER OF 50MM THK PLAIN SHOTCRETE SHALL BE APPLIED ON THE EXPOSED PARTS OF STEEL RIBS FOR PROTECTION AGAINST CORROSION.
- ROCK SUPPORT MEASURES SHOWN ON THIS DRAWING ARE PRELIMINARY ONLY. FINAL ARRANGEMENT OF ROCK SUPPORT (SHOTCRETE THICKNESSES; LENGTH, ORIENTATION AND GRID OF ROCK BOLTS) HAVE TO BE ADOPTED TO ACTUAL GEOTECHNICAL CONDITIONS, SUBJECT TO AGREEMENT BETWEEN OWNER AND CONTRACTOR.
- THE APPLICATION OF ROCK SUPPORT CLASSES (RSC) DEPENDS ON THE ACTUALLY ENCOUNTERED CONDITIONS AND GEOTECHNICAL MONITORING AND SHALL BE DECIDED BY THE RESPONSIBLE SECTION ENGINEER/GEOLOGIST.
- CONTOUR BLASTING HAS TO BE DONE SMOOTHLY WITH MINIMUM DAMAGE TO THE REMAINING ROCKMASS AND AVOIDING OVERBREAKS AS MUCH AS POSSIBLE.
- BOLT ORIENTATION SHALL BE ADAPTED TO ENCOUNTERED REQUIREMENTS, INSTALLED PERPENDICULAR TO THE ADIT PROFILE, IF DEVIATION FROM VERTICALITY REQUIRED SHALL BE RESTRICTED BELOW 30°.
- IN AREA WITH LARGE WATER INFLOW (SO THAT FULLY GROUTED-BOLT CANNOT BE PLACED) SWELLEX ANCHORS OF CORRESPONDING ARRANGEMENT COULD BE USED INSTEAD OF TEMPORARY SUPPORT UNTIL THE WATER INFLOW IS REDUCED TO A LEVEL THAT ALLOWS SHOTCRETING AND PLACEMENT BY FULLY GROUTED-BOLTS.
- DIPPING OR FLOWING WATER HAS TO BE COLLECTED IN PIPES BEFORE SHOTCRETING SPECIAL DRAIN HOLES MAY BE REQUIRED (USE SWELLEX BOLT).
- CONDITIONAL FOREPOLING FOR Q-VALUES <0.10, FOREPOLING UMBRELLA SHALL ADOPT AS PER MIN.: Ø25 FULLY GROUTED STEEL BARS, 6m EMBEDDED, 2.0m OVERLAP, 300mm SPACING, 10° ANGLE

NOTES:

- ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
- ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
- EXTERNAL DIMENSIONS REFER TO THE SHOTCRETE LINE = THE CLEAR PROFILE OF THE STRUCTURE. THE EXCAVATION LINE HAS TO BE ADJUSTED ACCORDING TO THE ACTUAL GEOLOGICAL CONDITIONS.
- ALL SHOTCRETE SHALL BE PLAIN SHOTCRETE WITH WIREMESH IF ASSIGNED IT ACCORDING TO ROCK SUPPORT.

DRAFT STATUS:
12.10.2018



Reference Drawings

Drwg. No.	Title
31-00053-DD-4310-Q1200	HEADWORK STRUCTURES - LAYOUT
31-00053-DD-4311-Q1210	CONNECTING TUNNEL TO HEADPOND-LONGITUDINAL SECTION AND DETAILS

Revisions	Name	Date	Notes



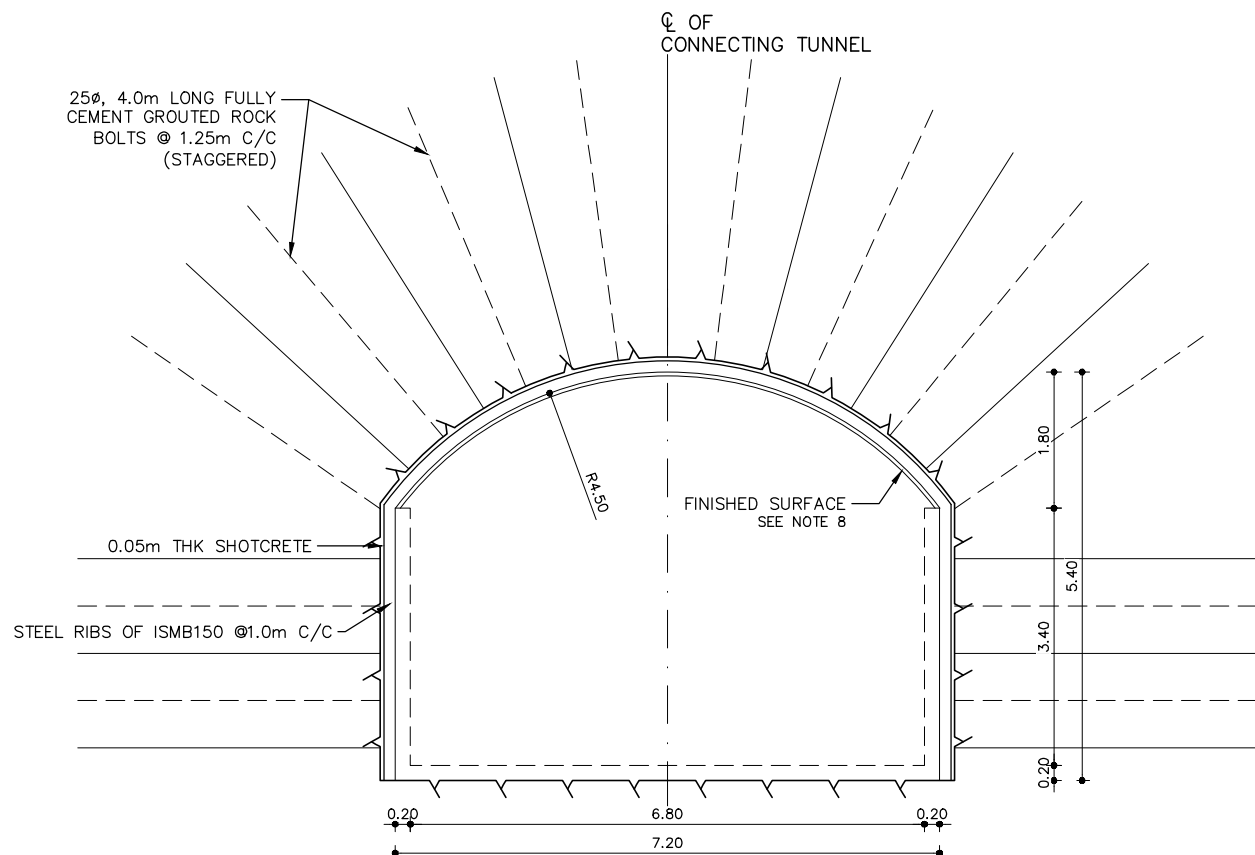
TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY



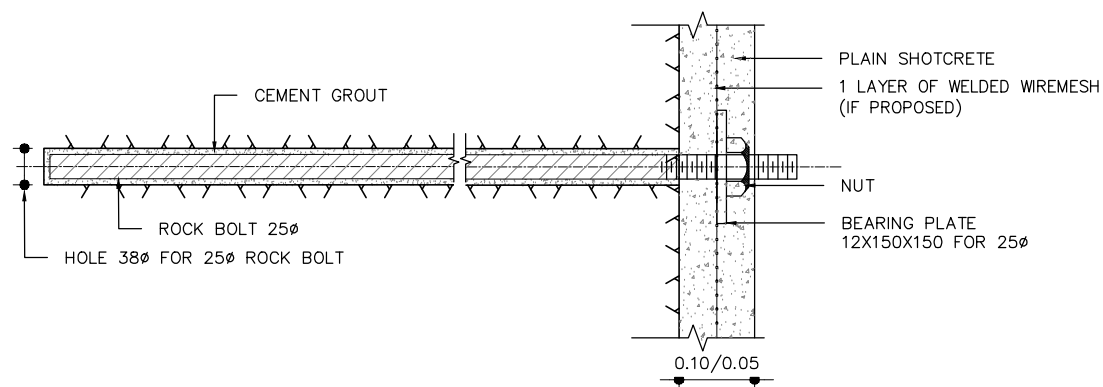
CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

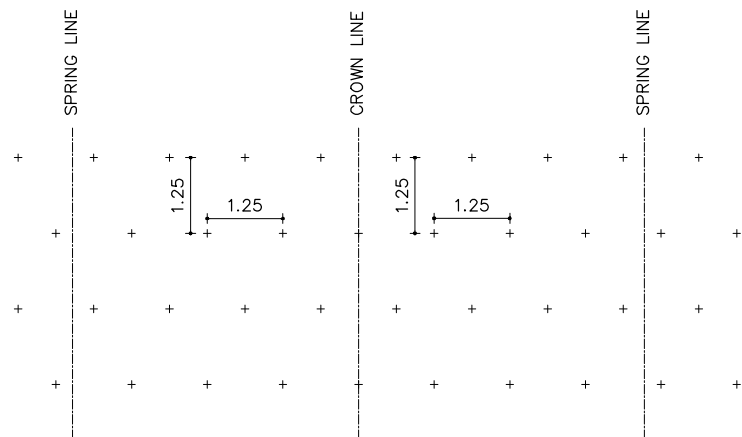
Name	Date	DETAILLED DESIGN
Prepared R. Shrivastava	27.09.18	HEADWORKS
Drawn A. K. Basu	27.09.18	CONNECTING TUNNEL TO HEADPOND
Checked Roloff	27.09.18	EXCAVATION AND
Approved Dr. Moeller	27.09.18	ROCK SUPPORT
Replaces Drwg. No:		SHEET 1 OF 2
CAD- File No.:		PROJECT DRAWING
Scale A3: 1:100	Drwg. No.: 31-00053-DD-4311-S 1217	REV. -



CONNECTING TUNNEL
TYPICAL DETAILS OF SUPPORT SYSTEM FOR ROCK CLASS V
SCALE 1:100



TYPICAL ROCK BOLT AND SHOTCRETE DETAILS
NOT TO SCALE



TYPICAL DETAILS OF ROCK BOLTS IN CROWN
FOR ROCK CLASS V
(DEVELOPED VIEW)
NOT TO SCALE

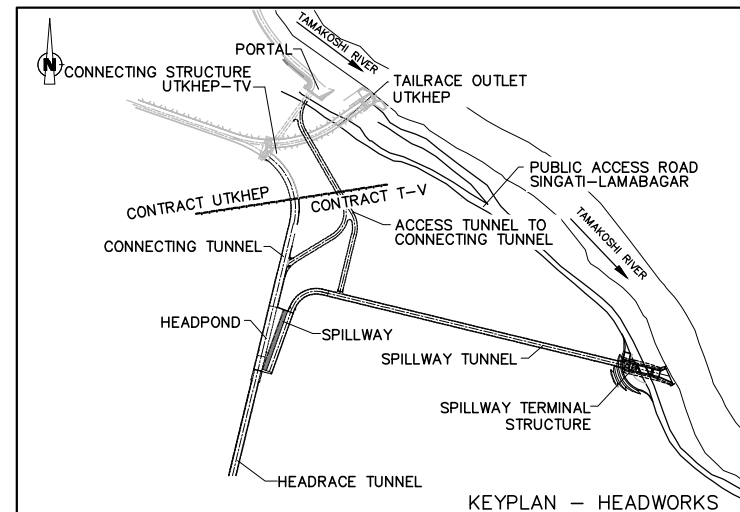
NOTES TO ROCK SUPPORT:

- ROCK BOLTS SHALL HAVE THE FOLLOWING CHARACTERISTICS:
 - DIA. 25 MM
 - YIELD STRENGTH 500 N/MM²
 - MAXIMUM TENSILE CAPACITY 213 KN
- THE SHOTCRETE MIX SHALL HAVE 28 DAYS OF COMPRESSIVE STRENGTH OF 35MPa.
- STEEL RIBS SHALL CONFORM TO IS:226-1975.
- AN ADDITIONAL LAYER OF 50MM THK PLAIN SHOTCRETE SHALL BE APPLIED ON THE EXPOSED PARTS OF STEEL RIBS FOR PROTECTION AGAINST CORROSION.
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- THE APPLICATION OF ROCK SUPPORT CLASSES (RSC) DEPENDS ON THE ACTUALLY ENCOUNTERED CONDITIONS AND GEOTECHNICAL MONITORING AND SHALL BE DECIDED BY THE RESPONSIBLE SECTION ENGINEER/GEOLOGIST.
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- IN AREA WITH LARGE WATER INFLOW (SO THAT FULLY GROUTED-BOLT CANNOT BE PLACED) SWELLEX ANCHORS OF CORRESPONDING ARRANGEMENT COULD BE USED INSTEAD OF TEMPORARY SUPPORT UNTIL THE WATER INFLOW IS REDUCED TO A LEVEL THAT ALLOWS SHOTCRETING AND PLACEMENT BY FULLY GROUTED-BOLTS.
- DIPPING OR FLOWING WATER HAS TO BE COLLECTED IN PIPES BEFORE SHOTCRETING SPECIAL DRAIN HOLES MAY BE REQUIRED (USE SWELLEX BOLT).
- CONDITIONAL FOREPOLING FOR Q-VALUES <0.10, FOREPOLING UMBRELLA SHALL ADOPT AS PER MIN.: ø25 FULLY GROUTED STEEL BARS, 6m EMBEDDED, 2.0m OVERLAP, 300mm SPACING, 10° ANGLE

NOTES:

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- ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
- EXTERNAL DIMENSIONS REFER TO THE SHOTCRETE LINE = THE CLEAR PROFILE OF THE STRUCTURE. THE EXCAVATION LINE HAS TO BE ADJUSTED ACCORDING TO THE ACTUAL GEOLOGICAL CONDITIONS.
- ALL SHOTCRETE SHALL BE PLAIN SHOTCRETE WITH WIREMESH IF ASSIGNED IT ACCORDING TO ROCK SUPPORT.

DRAFT STATUS:
12.10.2018



KEYPLAN - HEADWORKS

Reference Drawings

Drwg. No.	Title
31-00053-DD-4310-Q1200	HEADWORK STRUCTURES - LAYOUT
31-00053-DD-4310-Q1201	HEADWORK STRUCTURES - TUNNEL SYSTEM - DETAILED LAYOUT

Revisions

Name	Date	Notes
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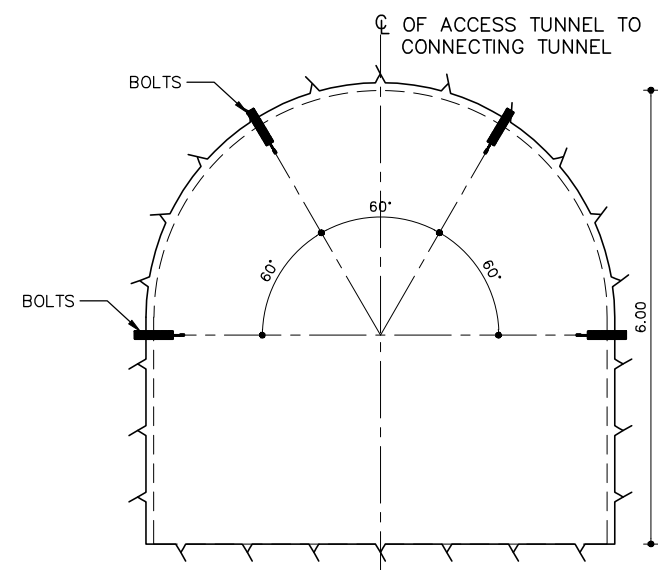
TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY



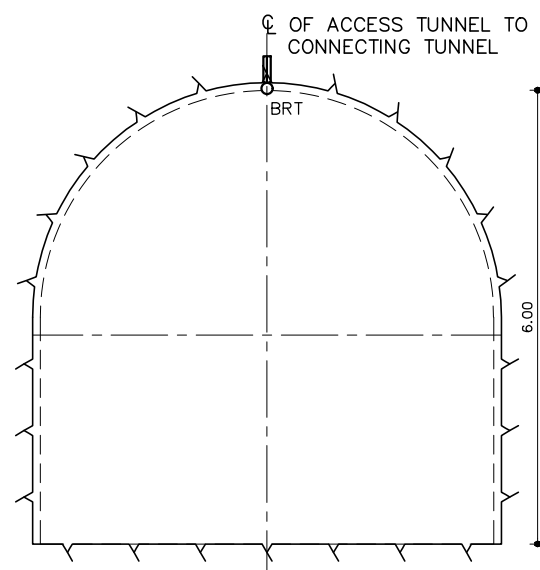
CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

Name	Date	DETAILLED DESIGN
Prepared	R. Shrivastava	27.09.18
Drawn	A. K. Basu	27.09.18
Checked	Roloff	27.09.18
Approved	Dr. Moeller	27.09.18
Replaces Drwg. No:		
CAD- File No.:		
Scale A3: 1:100		
Drwg. No.: 31-00053-DD-4311- S 1217	REV.	—



SECTION A-A
4 POINT CONVERGENCE ARRAY (TYP.)
(FOR CONVERGENCE MEASUREMENT)
SCALE 1:100



SECTION B-B
1 POINT ROOF SETTLEMENT POINT (TYP.)
(FOR ROOF SETTLEMENT MEASUREMENT)
SCALE 1:100

LEGEND:

BRT (BI-REFLEX-TARGET)
+
BOLTS

NOTES FOR INSTRUMENTATIONS:

DURING EXCAVATION:

CONVERGENCE:

- CONVERGENCE SECTION SHALL BE PLACED AT SECTIONS WHERE ACC. TO THE ROCK-MASS CLASSIFICATION SYSTEM Q-VALUES ARE LESS THAN 0.3 OR AT AREAS OF CONCERN (WITH HIGH INFLOW ZONES, LONG SECTIONS OF marginally poor rock masses, AT ADJACENT FAULT ZONES, AT INTERSECTION AREAS ETC.);
- DISTANCE BETWEEN CONVERGENCE SECTION FOR AREAS WITH $0.1 < Q\text{-VALUE} < 0.3$ SHALL BE LIMITED TO 15M, AT AREAS WITH $Q\text{-VALUE} < 0.1$ DISTANCE TO 6M;
- ADDITIONAL CONVERGENCE SECTION MAY BE ADDED ON THE DISCRETION OF THE ENGINEER;
- CONVERGENCE SECTION SHALL CONSIST OF 4 POINTS TRAPEZOIDAL ARRANGED;
- MEASUREMENT SHALL FOLLOW A FREQUENCY PATTERN SUCH AS
-DAILY MEASUREMENTS SHALL BE TAKEN FOR FIRST 20 DAYS OR UNTIL THE EXCAVATION FACE GETS FARTHER THAN 15M FROM THE SECTION;
-FOLLOWING WITH WEEKLY MEASUREMENTS OR UNTIL THE EXCAVATION FACE GETS FARTHER THAN 75M FROM THE SECTION. THEREAFTER, MEASUREMENTS SHALL BE EVALUATED AND IN CASE OF NO FLUCTUATION OR CONVERGENCE, MEASUREMENTS MAY ON MONTHLY BASIS.

EXTENSOMETER:

- SHALL BE INSTALLED AND MAINTAIN AT SECTIONS WITH Q-VALUE < 0.3 AND AT AREAS OF POSSIBLE CONCERN OR AS DIRECTED BY THE ENGINEER.
- MAXIMUM SPACING BETWEEN CONVERGENCE SECTION SHOULD NOT EXCEED 200 M AND MAXIMUM SPACING BETWEEN EXTENSOMETERS SHOULD NOT EXCEED 300 M.

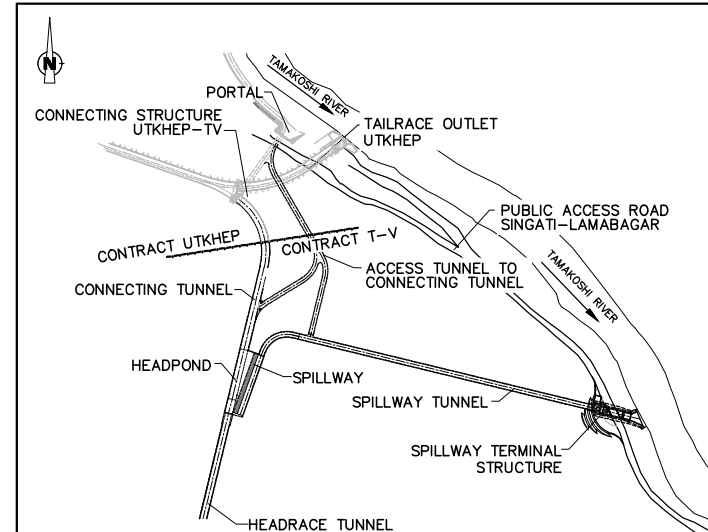
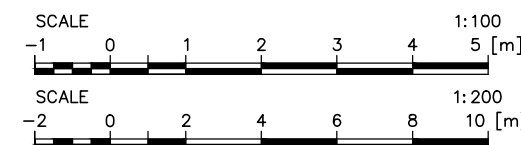
PERMANENT OR AFTER COMPLETION:

- LOCATION OF PERMANENT MONITORING SECTIONS SHALL BE INSTALLED ONLY AT AREA OF CONCERN (WITH HIGH INFLOW ZONES, LONG SECTIONS OF marginally poor rock masses, AT ADJACENT FAULT ZONES, AT INTERSECTION AREAS ETC.);
- MONITORING SECTION SHALL CONSIST OF REMOTE MONITORING DEVICES FOR MPBX EXTENSOMETER, LOAD CELL AND IF REQUIRED WIRE PIEZOMETER;
- CABLE IN SLEEVE PIPES PROVIDED FROM INDIVIDUAL INSTRUMENTS AT DIFFERENT LOCATIONS WILL BE CONNECTED TO SWITCH BOXES FOR OBSERVING DATA AND ROUTED TO READING POINTS WHICH SHALL BE NEARBY AT AN ACCESSIBLE PLACE.

NOTES:

- ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
- ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
- CABLE FROM INDIVIDUAL INSTRUMENTS AT DIFFERENT LOCATIONS WILL BE CONNECTED TO SWITCH BOXES FOR OBSERVING DATA.
- CABLES WILL BE PROVIDED IN CONDUITS AND PROTECTIVE COVER WILL BE PROVIDED FOR INSTRUMENTS.

DRAFT STATUS:
04.10.2018



Reference Drawings

Drwg. No.	Title
31-00053-DD-4315-1215...	HEADWORKS, ACCESS TO CoT, LONGITUDINAL SECTIONS AND DETAILS

Revisions	Name	Date	Notes



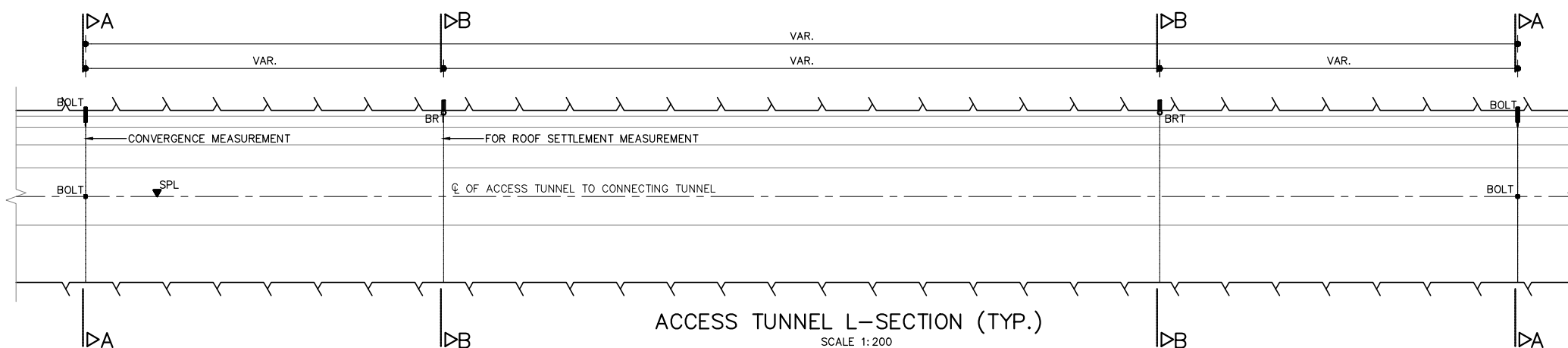
TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY

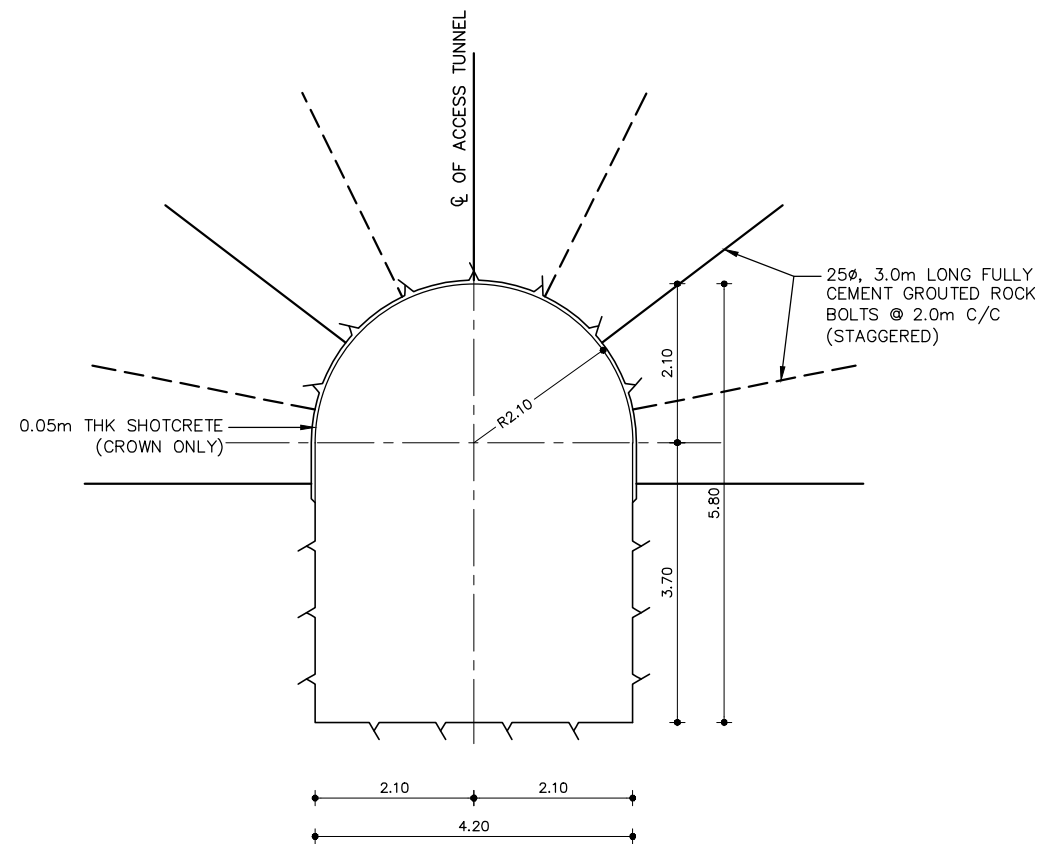


CONSULTING ENGINEERS
BAD VILBEL, GERMANY

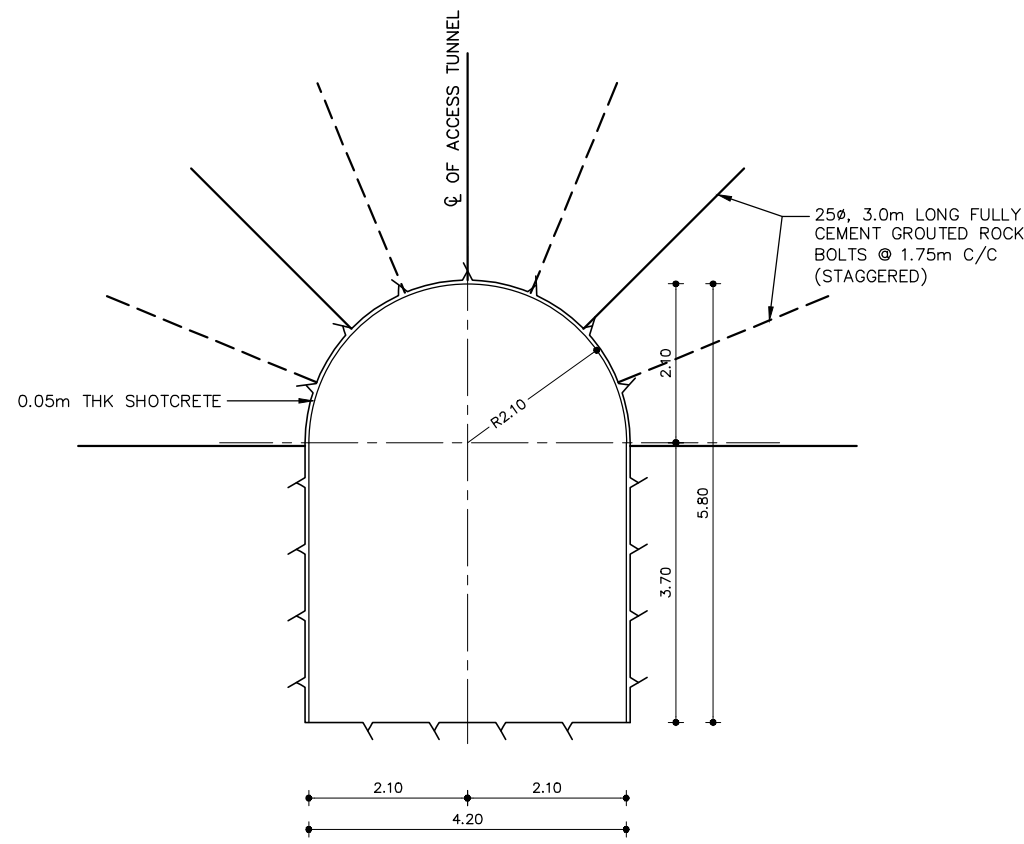
TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

Name	Date	DETAILLED DESIGN
Prepared R. Shrivastava	04.10.18	HEADWORKS
Drawn A. K. Basu	04.10.18	ACCESS TUNNEL TO
Checked Roloff	04.10.18	CONNECTING TUNNEL
Approved Dr. Moeller	04.10.18	INSTRUMENTATION DETAILS
Replaces Drwg. No:		
CAD- File No.:		
Scale A3: 1:100, 1:200		PROJECT DRAWING
Drwg. No.: 31-00053-DD-4315-	S 1218	REV. -

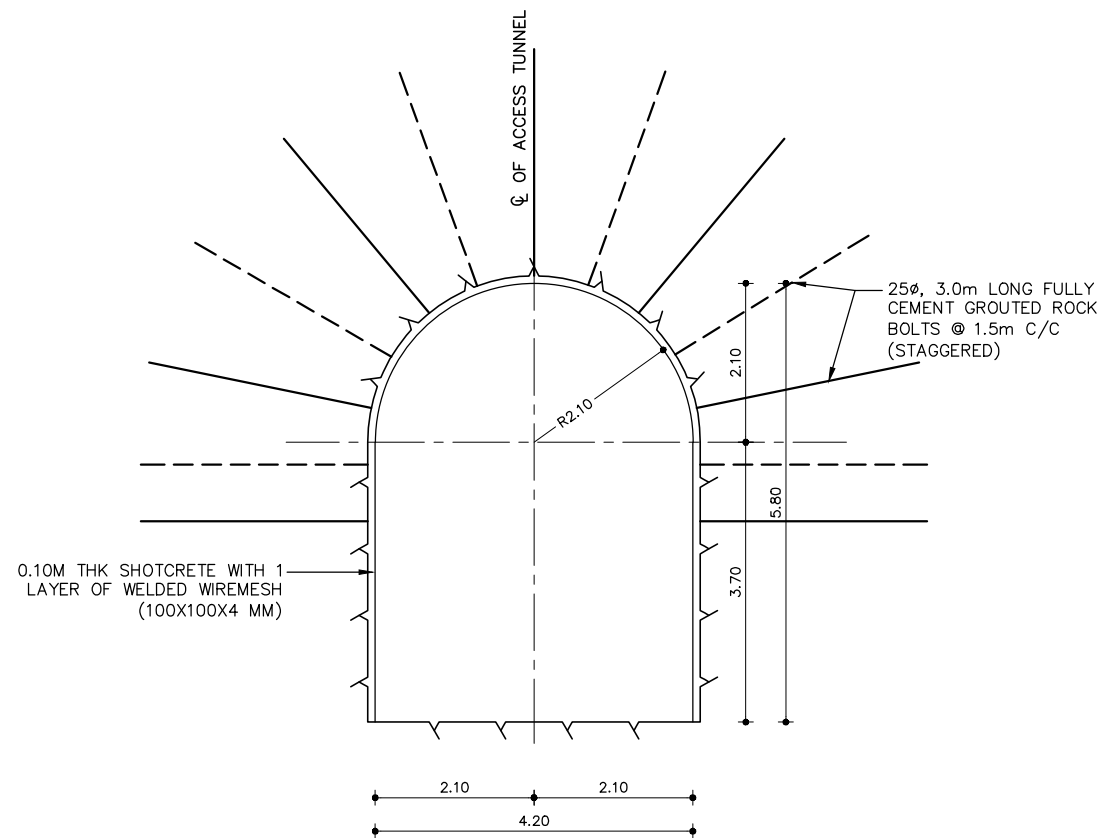




TYPICAL DETAILS OF SUPPORT SYSTEM
FOR ROCK CLASS II



TYPICAL DETAILS OF SUPPORT SYSTEM
FOR ROCK CLASS III



TYPICAL DETAILS OF SUPPORT SYSTEM
FOR ROCK CLASS IV

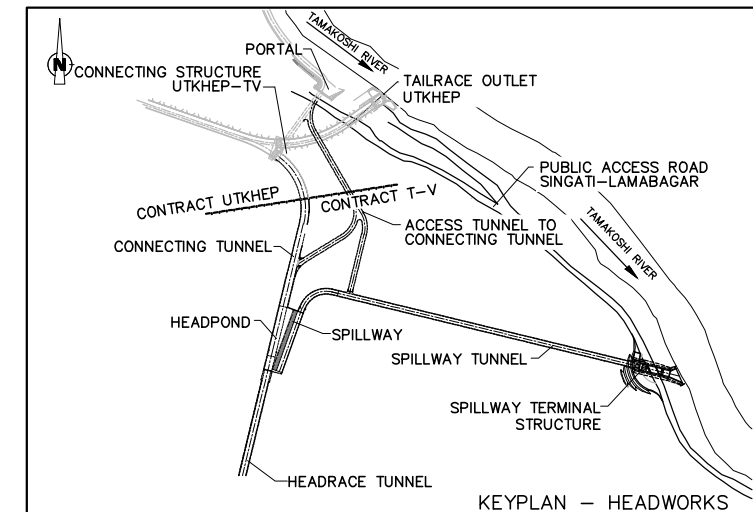
NOTES:

- ROCK BOLTS SHALL HAVE THE FOLLOWING CHARACTERISTICS:
 - DIA. 25 MM
 - YIELD STRENGTH 500 N/MM²
 - MAXIMUM TENSILE CAPACITY 213 KN
- THE SHOTCRETE MIX SHALL HAVE 28 DAYS OF COMPRESSIVE STRENGTH OF 35MPa.
- STEEL RIBS SHALL CONFORM TO IS:226-1975.
- AN ADDITIONAL LAYER OF 50MM THK PLAIN SHOTCRETE SHALL BE APPLIED ON THE EXPOSED PARTS OF STEEL RIBS FOR PROTECTION AGAINST CORROSION.
- ROCK SUPPORT MEASURES SHOWN ON THIS DRAWING ARE PRELIMINARY ONLY. FINAL ARRANGEMENT OF ROCK SUPPORT (SHOTCRETE THICKNESSES; LENGTH, ORIENTATION AND GRID OF ROCK BOLTS) HAVE TO BE ADOPTED TO ACTUAL GEOTECHNICAL CONDITIONS, SUBJECT TO AGREEMENT BETWEEN OWNER AND CONTRACTOR.
- THE APPLICATION OF ROCK SUPPORT CLASSES (RSC) DEPENDS ON THE ACTUALLY ENCOUNTERED CONDITIONS AND GEOTECHNICAL MONITORING AND SHALL BE DECIDED BY THE RESPONSIBLE SECTION ENGINEER/GEOLOGIST.
- CONTOUR BLASTING HAS TO BE DONE SMOOTHLY WITH MINIMUM DAMAGE TO THE REMAINING ROCKMASS AND AVOIDING OVERBREAKS AS MUCH AS POSSIBLE.
- BOLT ORIENTATION SHALL BE ADAPTED TO ENCOUNTERED REQUIREMENTS, INSTALLED PERPENDICULAR TO THE ADIT PROFILE, IF DEVIATION FROM VERTICALITY REQUIRED SHALL BE RESTRICTED BELOW 30°.
- IN AREA WITH LARGE WATER INFLOW (SO THAT FULLY GROUTED-BOLT CANNOT BE PLACED) SWELLEX ANCHORS OF CORRESPONDING ARRANGEMENT COULD BE USED INSTEAD OF TEMPORARY SUPPORT UNTIL THE WATER INFLOW IS REDUCED TO A LEVEL THAT ALLOWS SHOTCRETING AND PLACEMENT BY FULLY GROUTED-BOLTS.
- DIPPING OR FLOWING WATER HAS TO BE COLLECTED IN PIPES BEFORE SHOTCRETING SPECIAL DRAIN HOLES MAY BE REQUIRED (USE SWELLEX BOLT).
- CONDITIONAL FOREPOLING FOR Q-VALUES <0.10, FOREPOLING UMBRELLA SHALL ADOPT AS PER MIN.: Ø25 FULLY GROUTED STEEL BARS, 6m EMBEDDED, 2.0m OVERLAP, 300mm SPACING, 10° ANGLE

NOTES:

- ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
- ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
- EXTERNAL DIMENSIONS REFER TO THE SHOTCRETE LINE = THE CLEAR PROFILE OF THE STRUCTURE. THE EXCAVATION LINE HAS TO BE ADJUSTED ACCORDING TO THE ACTUAL GEOLOGICAL CONDITIONS.
- ALL SHOTCRETE SHALL BE PLAIN SHOTCRETE WITH WIREMESH IF ASSIGNED IT ACCORDING TO ROCK SUPPORT.

DRAFT STATUS:
10.10.2018



Reference Drawings

Drwg. No.	Title
31-00053-DD-4310-Q-1201	HEADWORKS, HEADWORK STRUCTURES, TUNNEL SYSTEM, LAYOUT

Revisions	Name	Date	Notes



TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY



CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

	Name	Date
Prepared	R. Shrivastava	04.09.18
Drawn	A. K. Basu	04.09.18
Checked	Roloff	04.09.18
Approved	Dr. Moeller	04.09.18
Replaces Drwg. No:		

CAD- File No.:	DETAILED DESIGN HEADWORKS ACCESS TUNNEL TO CONNECTING TUNNEL EXCAVATION AND ROCK SUPPORT (SHEET 1 OF 2) PROJECT DRAWING
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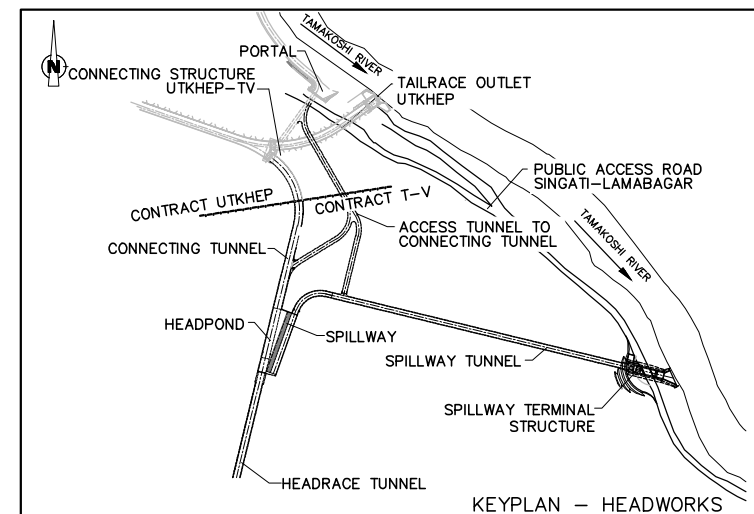
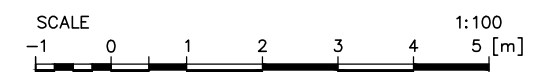
Scale A3: 1:1000/ 200	Drwg. No.: 31-00053-DD-4315- S 1219	REV. -
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1. ROCK BOLTS SHALL HAVE THE FOLLOWING CHARACTERISTICS:
 - DIA. 25 MM
 - YIELD STRENGTH 500 N/MM²
 - MAXIMUM TENSILE CAPACITY 213 KN
2. THE SHOTCRETE MIX SHALL HAVE 28 DAYS OF COMPRESSIVE STRENGTH OF 35MPa.
3. STEEL RIBS SHALL CONFORM TO IS: 226-1975.
4. AN ADDITIONAL LAYER OF 50MM THK PLAIN SHOTCRETE SHALL BE APPLIED ON THE EXPOSED PARTS OF STEEL RIBS FOR PROTECTION AGAINST CORROSION.
5. ROCK SUPPORT MEASURES SHOWN ON THIS DRAWING ARE PRELIMINARY ONLY. FINAL ARRANGEMENT OF ROCK SUPPORT (SHOTCRETE THICKNESSES; LENGTH, ORIENTATION AND GRID OF ROCK BOLTS) HAVE TO BE ADOPTED TO ACTUAL GEOTECHNICAL CONDITIONS, SUBJECT TO AGREEMENT BETWEEN OWNER AND CONTRACTOR.
6. THE APPLICATION OF ROCK SUPPORT CLASSES (RSC) DEPENDS ON THE ACTUALLY ENCOUNTERED CONDITIONS AND GEOTECHNICAL MONITORING AND SHALL BE DECIDED BY THE RESPONSIBLE SECTION ENGINEER/GEOLOGIST.
7. CONTOUR BLASTING HAS TO BE DONE SMOOTHLY WITH MINIMUM DAMAGE TO THE REMAINING ROCKMASS AND AVOIDING OVERBREAKS AS MUCH AS POSSIBLE.
8. BOLT ORIENTATION SHALL BE ADAPTED TO ENCOUNTERED REQUIREMENTS, INSTALLED PERPENDICULAR TO THE ADIT PROFILE, IF DEVIATION FROM VERTICALITY REQUIRED SHALL BE RESTRICTED BELOW 30°.
9. IN AREA WITH LARGE WATER INFLOW (SO THAT FULLY GROUTED-BOLT CANNOT BE PLACED) SWELLEX ANCHORS OF CORRESPONDING ARRANGEMENT COULD BE USED INSTEAD OF TEMPORARY SUPPORT UNTIL THE WATER INFLOW IS REDUCED TO A LEVEL THAT ALLOWS SHOTCRETING AND PLACEMENT BY FULLY GROUTED-BOLTS.
10. DRIPPING OR FLOWING WATER HAS TO BE COLLECTED IN PIPES BEFORE SHOTCRETING SPECIAL DRAIN HOLES MAY BE REQUIRED (USE SWELLEX BOLT).
11. CONDITIONAL FOREPOLING FOR Q-VALUES <0.10, FOREPOLING UMBRELLA SHALL ADOPT AS PER MIN.: Ø25 FULLY GROUTED STEEL BARS, 6m EMBEDDED, 2.0m OVERLAP, 300mm SPACING, 10° ANGLE

1. ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. EXTERNAL DIMENSIONS REFER TO THE SHOTCRETE LINE = THE CLEAR PROFILE OF THE STRUCTURE. THE EXCAVATION LINE HAS TO BE ADJUSTED ACCORDING TO THE ACTUAL GEOLOGICAL CONDITIONS.
4. ALL SHOTCRETE SHALL BE PLAIN SHOTCRETE WITH WIREMESH IF ASSIGNED IT ACCORDING TO ROCK SUPPORT.

DRAFT STATUS:
10.10.2018



Reference Drawings	
Drwg. No.	Title
31-00053-DD-4310-Q-1201	HEADWORKS, HEADWORK STRUCTURES, TUNNEL SYSTEM, LAYOUT

Revisions			
	Name	Date	Notes



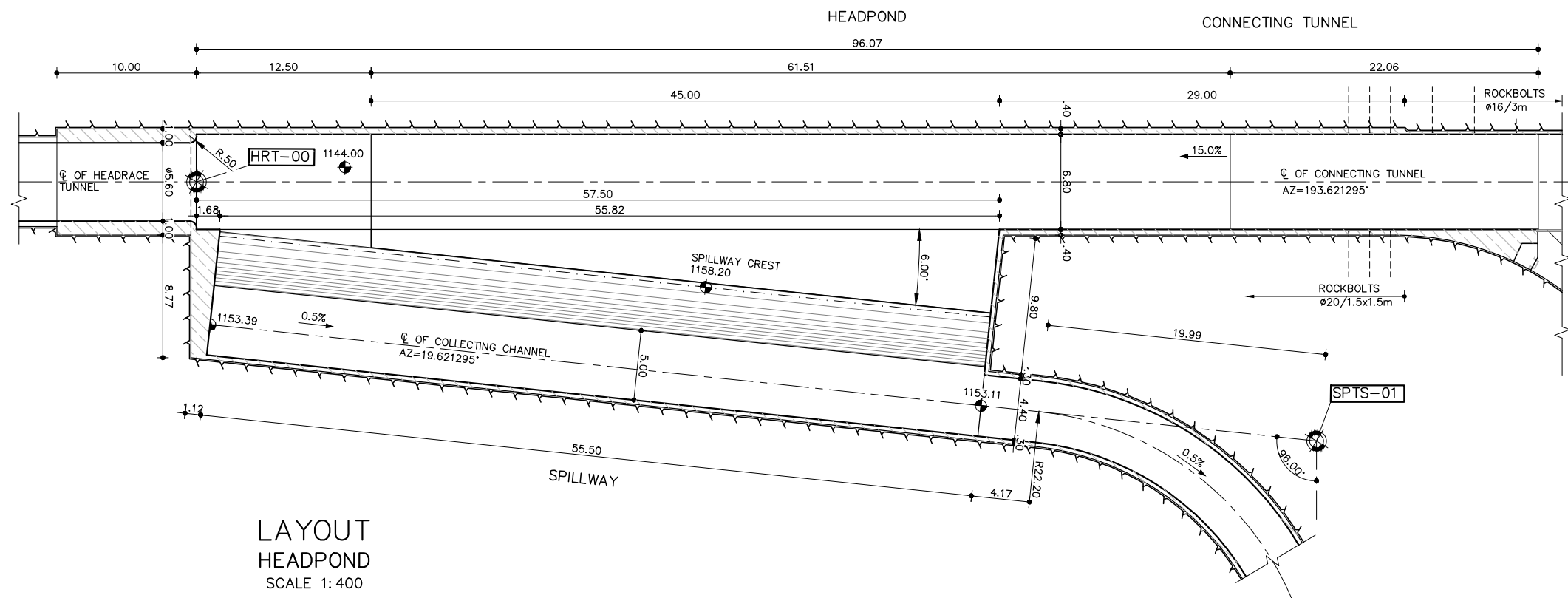
TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY



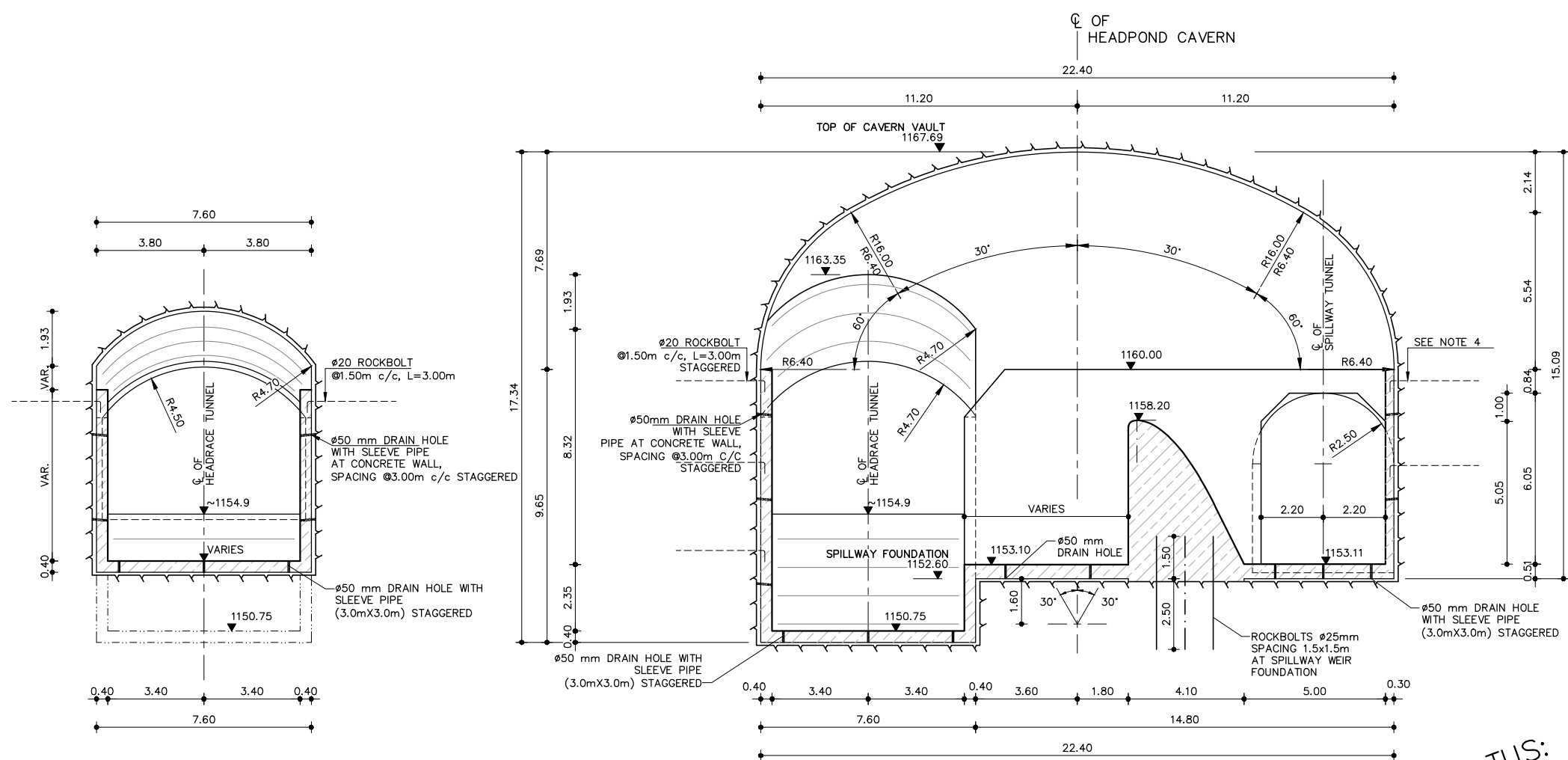
CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

	Name	Date	DETAILED DESIGN <u>HEADWORKS</u> <u>ACCESS TUNNEL TO</u> <u>CONNECTING TUNNEL</u> EXCAVATION AND ROCK SUPPORT (SHEET 2 OF 2) PROJECT DRAWING
Prepared	R. Shrivastava	04.09.18	
Drawn	A. K. Basu	04.09.18	
Checked	Roloff	04.09.18	
Approved	Dr. Moeller	04.09.18	
Replaces Drwg. No: 31-00053-DD-4364-Y-0000_—			
<u>CAD— File No.:</u>			S 1219 REV. —
Scale A3:	1:100		



LAYOUT
HEADPOND
SCALE 1: 400



SECTION B-B
HEADPOND RAMP
SCALE 1: 200

SECTION C-C
HEADPOND US WALL
SCALE 1: 200

DRAFT STATUS:
13.09.2018

NOTES:

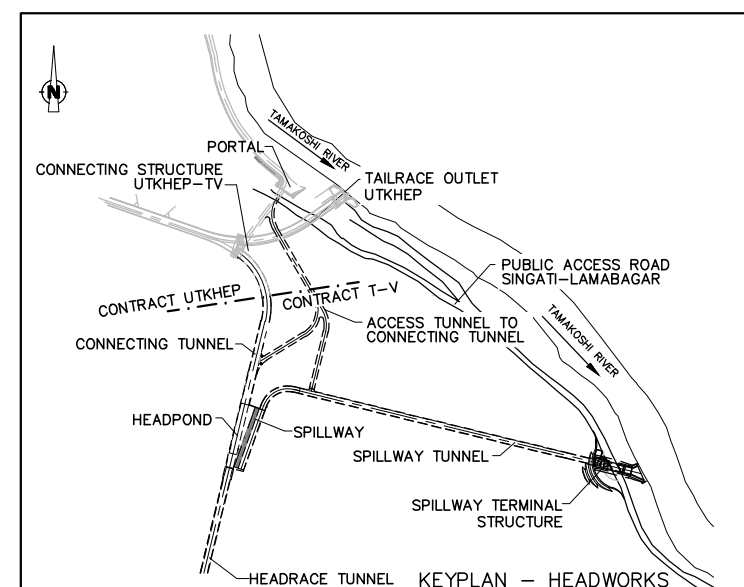
1. ALL DIMENSIONS ARE IN METERS [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. CO-ORDINATES BASED ON NATIONAL GEODETIC NETWORK SYSTEM (EVEREST 1830).
4. ROCKBOLTS FOR CONCRETE WALLS OF HEADPOND AS INDICATED SHALL BE PROVIDED AT THE ENTIRE PERIPHERY OF CONCRETE LINING WITH SPACING OF 1.5m c/c

LEGEND:

- AZ AZIMUTH [°]
 ELEVATION
 FIX POINT
 CONCRETE CLASS C1 – CONCRETE C25/30
 CONCRETE CLASS F – BLINDING CONCRETE C12/15
 UNFINISHED TOP OF SLAB
 FINISHED FLOOR LEVEL

SCALE 1: 200
 -2 0 2 4 6 8 10 [m]

SCALE 1: 400
 -4 0 4 8 12 16 20 [m]



Reference Drawings

Drwg. No.	Title
31-00053-DD-4310-Q1201	HEADWORK STRUCTURES – TUNNEL SYSTEM – DETAILED LAYOUT

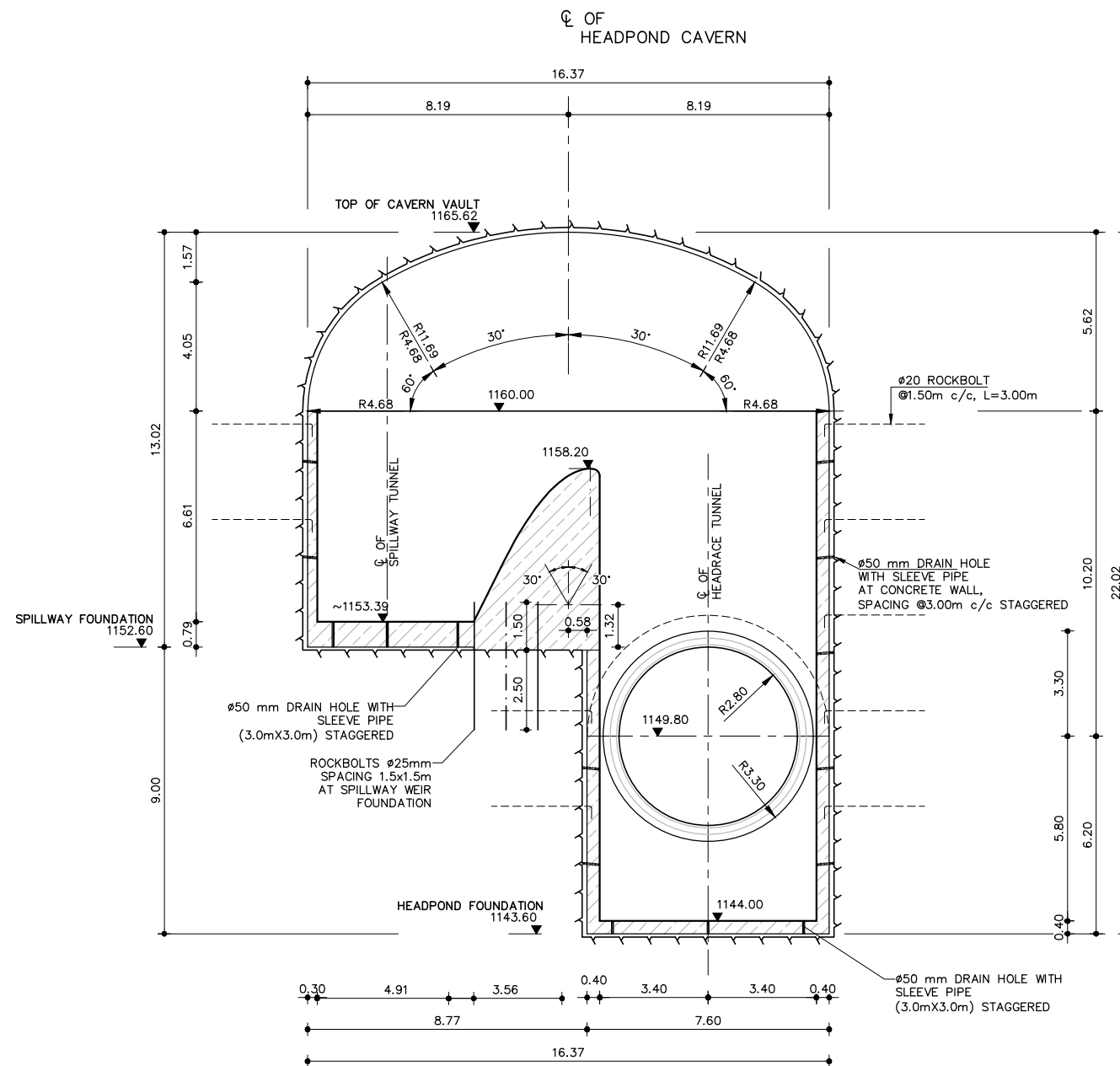
Revisions	Name	Date	Notes

TAMAKOSHI V HYDROELECTRIC PROJECT
 PROJECT DEVELOPMENT DEPARTMENT
 ENGINEERING SERVICES DIRECTORATE
 NEPAL ELECTRICITY AUTHORITY

LAHMEYER INTERNATIONAL
 CONSULTING ENGINEERS
 BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

Name	Date	DETAILLED DESIGN
Prepared B. Khadka	31.07.17	HEADWORKS
Drawn B. Khadka		HEADPOND
Checked Roloff		DETAILED LAYOUT,
Approved Dr. Moeller		CROSS SECTION B-B AND
Replaces Drwg. No:		CROSS SECTION C-C
31-00053-DD-4316-Y-0000_		PROJECT DRAWING
CAD- File No.:		
Scale A3: 1: 400/200	Drwg. No.: 31-00053-DD-4316-Q 1220	REV. —



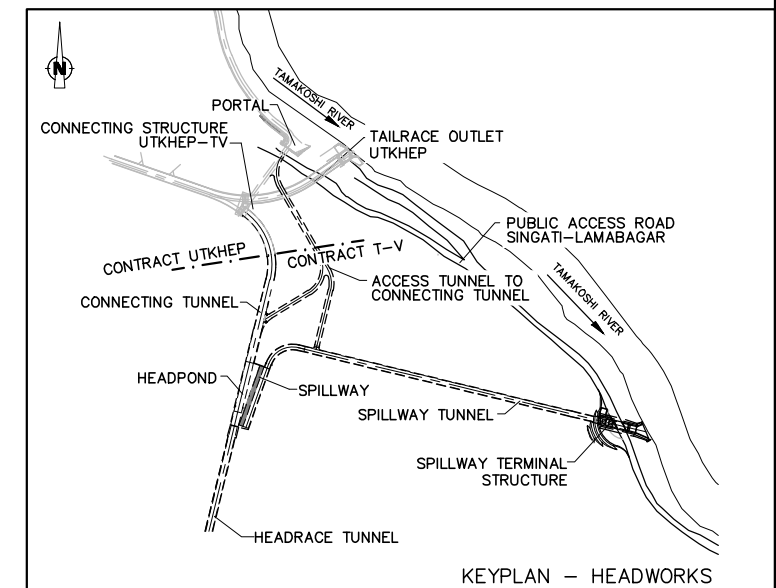
SECTION D-D
HEADPOND DS WALL/ INTAKE HRT
SCALE 1:200

NOTES:

1. ALL DIMENSIONS ARE IN METERS [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. CO-ORDINATES BASED ON NATIONAL GEODETIC NETWORK SYSTEM (EVEREST 1830).
4. ROCKBOLTS FOR CONCRETE WALLS AS INDICATED SHALL BE PROVIDED AT THE ENTIRE PERIPHERY OF CONCRETE LINING WITH SPACING OF 1.5m c/c

LEGEND:

- AZ AZIMUTH [°]
 ELEVATION
 FIX POINT
 CONCRETE CLASS C1 – CONCRETE C25/30
 CONCRETE CLASS F – BLINDING CONCRETE C12/15
 UNFINISHED TOP OF SLAB
 FINISHED FLOOR LEVEL



Reference Drawings

Drwg. No.	Title
31-00053-DD-4310-Q1201	HEADWORK STRUCTURES – TUNNEL SYSTEM – DETAILED LAYOUT

Revisions	Name	Date	Notes



TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY

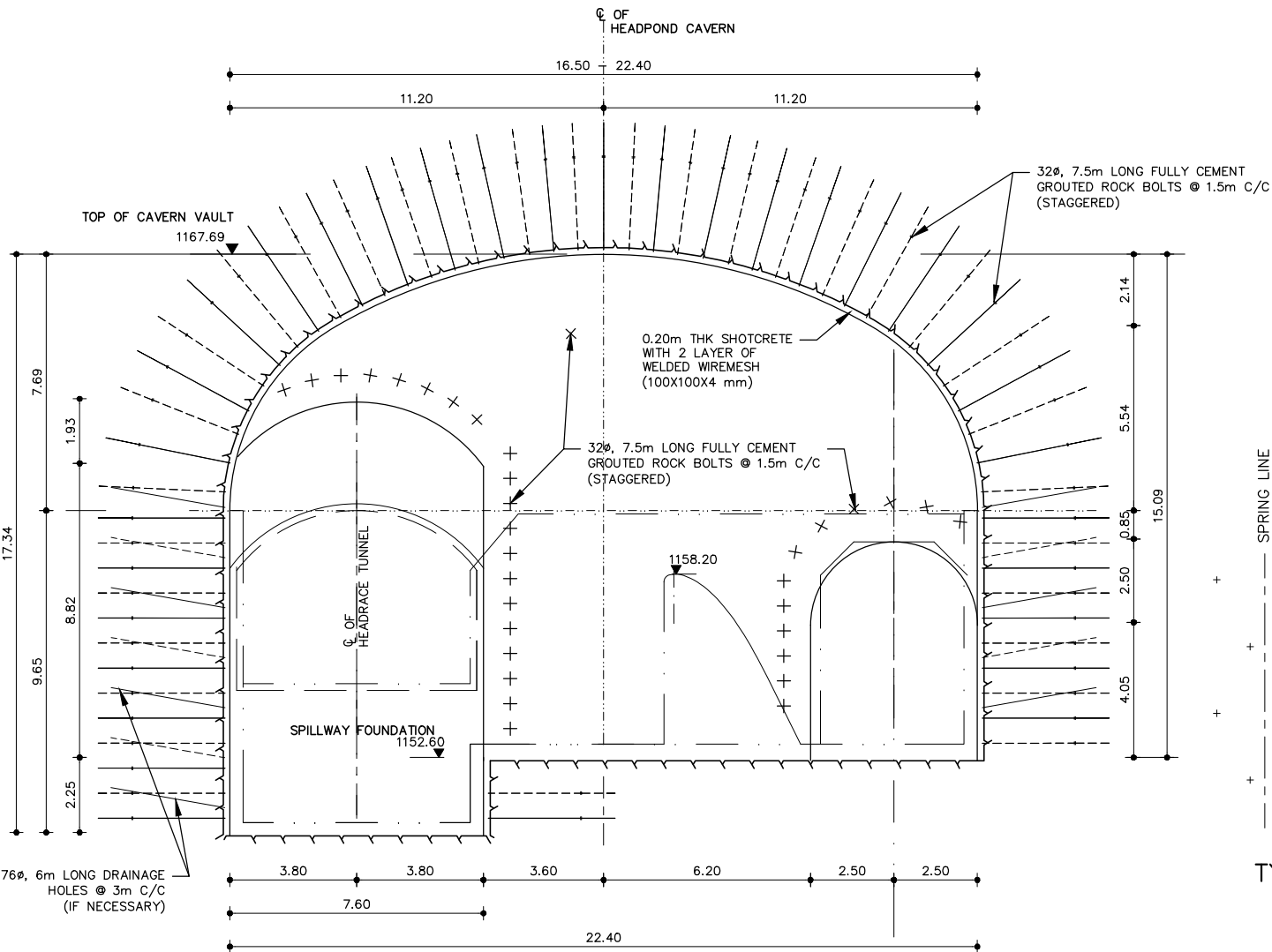


CONSULTING ENGINEERS
BAD VILBEL, GERMANY

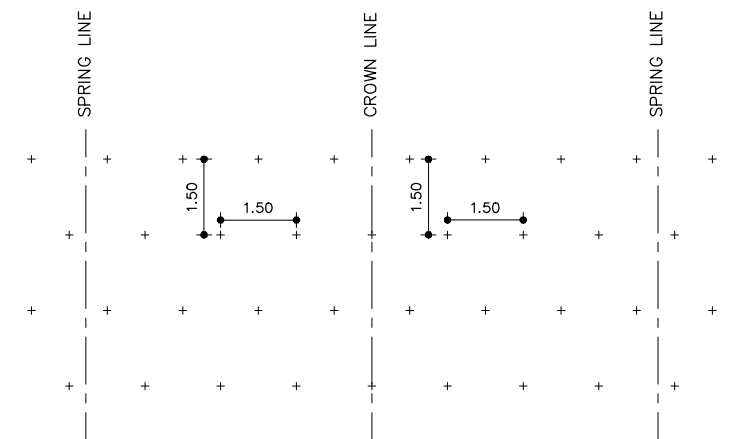
TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

Name	Date	DETAILLED DESIGN
Prepared B. Khadka	31.07.17	HEADWORKS
Drawn B. Khadka		HEADPOND
Checked Roloff		CROSS SECTION D-D
Approved Dr. Moeller		
Replaces Drwg. No: 31-00053-DD-4316-Y-0000_		
CAD- File No.:		
Scale A3: 1:200		PROJECT DRAWING
Drwg. No.: 31-00053-DD-4316-Q 1221	REV. -	

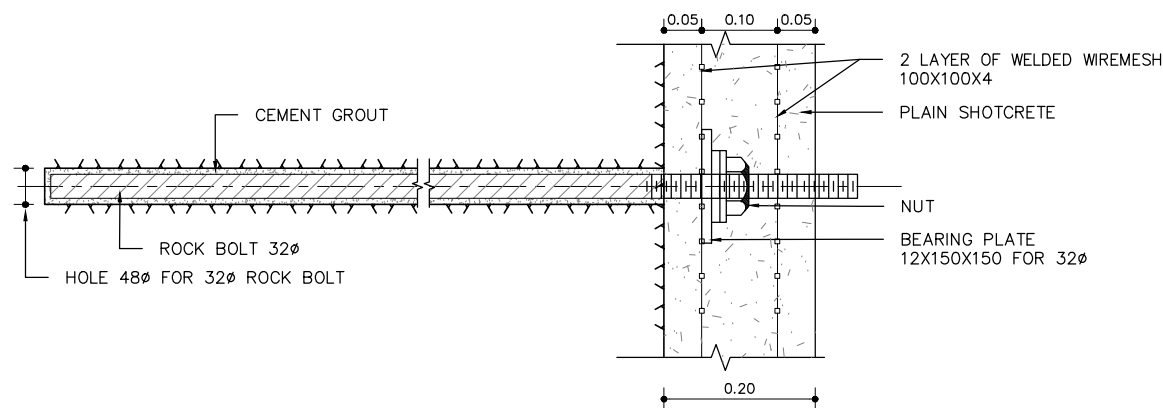
DRAFT STATUS:
13.09.2018



SECTION C-C
HEADPOND US WALL
ROCK SUPPORT DETAIL
SCALE 1:200



TYPICAL DETAILS OF ROCK BOLTS IN CROWN
(DEVELOPED VIEW)
NOT TO SCALE



TYPICAL ROCK BOLT AND SHOTCRETE DETAILS
NOT TO SCALE

NOTES ON ROCKSUPPORT:

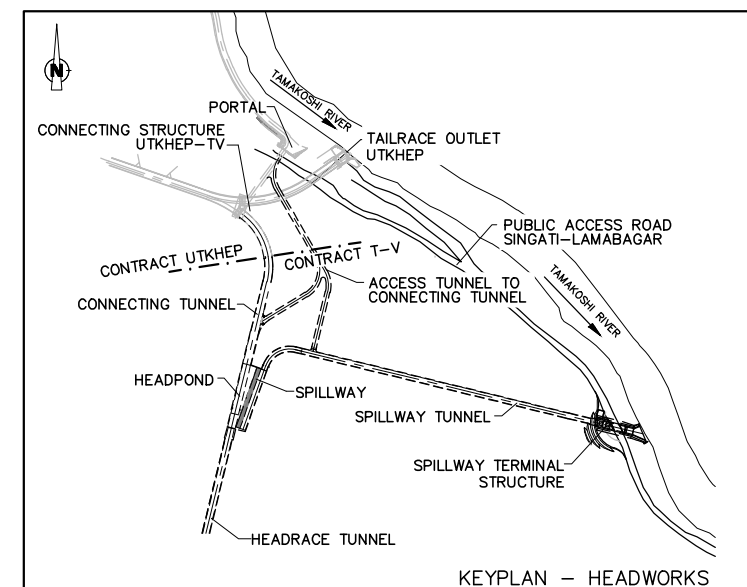
- EXTERNAL DIMENSIONS REFER TO THE SHOTCRETE LINE = THE CLEAR PROFILE OF THE STRUCTURE. THE EXCAVATION LINE HAS TO BE ADJUSTED ACCORDING TO THE ACTUAL GEOLOGICAL CONDITIONS.
- ALL SHOTCRETE SHALL BE PLAIN SHOTCRETE.
- FULLY CEMENT GROUTED ROCK BOLTS SHALL HAVE THE FOLLOWING CHARACTERISTICS:
 - DIA. 32 MM
 - YIELD STRENGTH 500 N/MM²
 - MAXIMUM TENSILE CAPACITY 349 KN
- ROCK SUPPORT MEASURES SHOWN ON THIS DRAWING ARE PRELIMINARY ONLY. FINAL ARRANGEMENT OF ROCK SUPPORT (SHOTCRETE THICKNESSES; LENGTH, ORIENTATION AND GRID OF ROCK BOLTS) HAVE TO BE ADOPTED TO ACTUAL GEOTECHNICAL CONDITIONS, SUBJECT TO AGREEMENT BETWEEN OWNER AND CONTRACTOR.
- 10 NOS. PRESTRESSED ROCK ANCHORS WITH A LENGTH OF 20 M AND A WORKING LOAD OF 1,000 KN HAVE TO BE AVAILABLE ON SITE FOR UNEXPECTED GEOTECHNICAL CONDITIONS.
- INTERSECTING TUNNELS ON THE LAST 12M BEFORE ENTERING THE CHAMBER SHALL BE SUPPORTED 1 RS HIGHER THAN WOULD BE APPLICABLE ACCORDING TO THE GEOLOGY.
- ROCKSUPPORT ON THE PERIPHERY OF INTERSECTING TUNNEL DEPENDS ON SEQUENCE OF EXCAVATION AND SHALL BE MODIFIED BY THE ENGINEER AT SITE PRIOR APPLYING.

NOTES DRAIN HOLES:

- DRAIN HOLES SHALL BE DRILLED AFTER INSTALLATION OF BOLTS
- DRAIN HOLES L=6.00 m, INCLINED 5°. DIA Ø76 mm
- DRAIN HOLE SHALL BE EQUIPPED WITH SUITABLE FILTER PIPES (SLOTTED PVC PIPES WRAPPED WITH GEOTEXTILE) PATTERN 9 m² (3.00 BY 3.00).
- DRAIN HOLE PATTERN MAY BE ADJUSTED ON SITE TO SUIT WATER INFLOW FROM PARTICULARLY PERMEABLE ROCK STRATA. DRAIN HOLES IN THE CAVERN VAULT SHALL BE ALIGNED VERTICALLY, TO ALLOW FOR DIRECT CONNECTION OF VERTICAL COLLECTING PIPES.

NOTES:

- ALL DIMENSIONS ARE IN METERS [m] UNLESS OTHERWISE NOTED.
- ALL ELEVATIONS ARE IN [masl].
- MONITORING SYSTEM NOT SHOWN ON THIS DRAWING.



Reference Drawings

Drwg. No.	Title
31-00053-DD-4316-1220...	HEADWORKS, HEADPOND, PLAN AND SECTIONS

Revisions	Name	Date	Notes



TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY

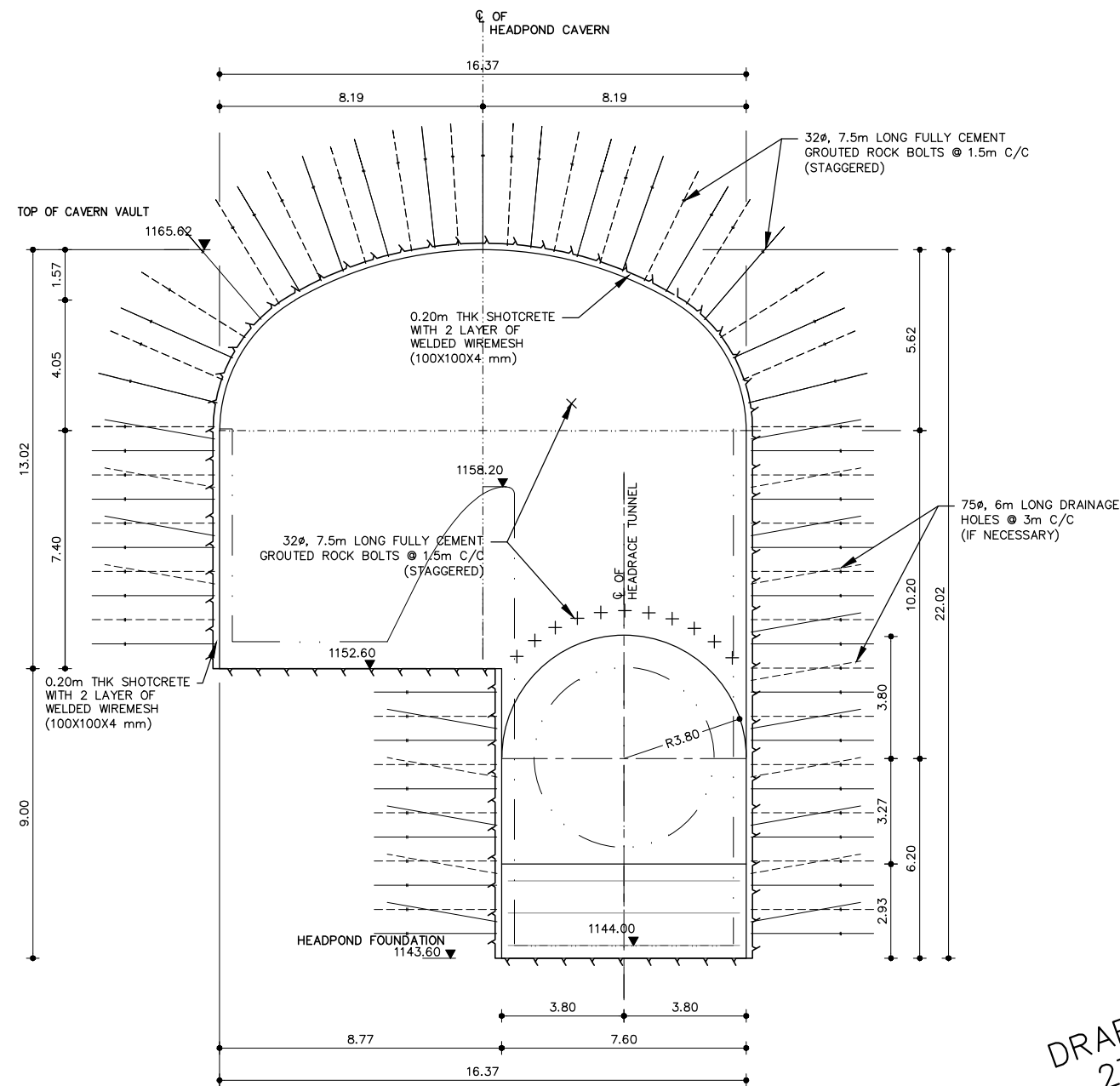


CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

Name	Date	DETAILLED DESIGN
Prepared R. Shrivastava	27.09.18	HEADWORKS
Drawn A. K. Basu	27.09.18	HEADPOND
Checked Roloff	27.09.18	CROSS SECTION C-C
Approved Dr. Moeller	27.09.18	US WALL AND CAVERN
Replaces Drwg. No: 31-00053-DD-4316-Y-0000_		ROCK SUPPORT
CAD- File No.:		PROJECT DRAWING
Scale A3: 1:200	Drwg. No.: 31-00053-DD-4316-	S 1225 REV. -

DRAFT STATUS:
27.09.2018



NOTES ON ROCKSUPPORT:

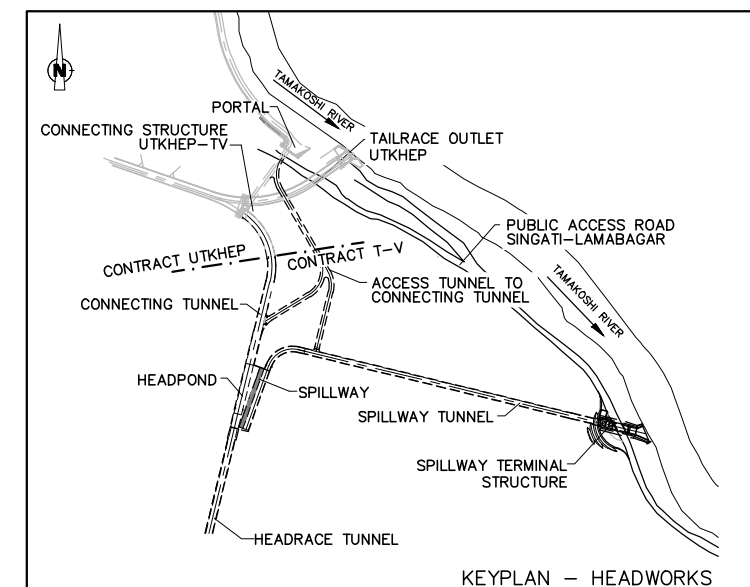
- EXTERNAL DIMENSIONS REFER TO THE SHOTCRETE LINE = THE CLEAR PROFILE OF THE STRUCTURE. THE EXCAVATION LINE HAS TO BE ADJUSTED ACCORDING TO THE ACTUAL GEOLOGICAL CONDITIONS.
- ALL SHOTCRETE SHALL BE PLAIN SHOTCRETE.
- FULLY CEMENT GROUTED ROCK BOLTS SHALL HAVE THE FOLLOWING CHARACTERISTICS:
 - DIA. 32 MM
 - YIELD STRENGTH 500 N/MM²
 - MAXIMUM TENSILE CAPACITY 349 KN
- ROCK SUPPORT MEASURES SHOWN ON THIS DRAWING ARE PRELIMINARY ONLY. FINAL ARRANGEMENT OF ROCK SUPPORT (SHOTCRETE THICKNESSES; LENGTH, ORIENTATION AND GRID OF ROCK BOLTS) HAVE TO BE ADOPTED TO ACTUAL GEOTECHNICAL CONDITIONS, SUBJECT TO AGREEMENT BETWEEN OWNER AND CONTRACTOR.
- 10 NOS. PRESTRESSED ROCK ANCHORS WITH A LENGTH OF 20 M AND A WORKING LOAD OF 1,000 KN HAVE TO BE AVAILABLE ON SITE FOR UNEXPECTED GEOTECHNICAL CONDITIONS.
- INTERSECTING TUNNELS ON THE LAST 12M BEFORE ENTERING THE CHAMBER SHALL BE SUPPORTED 1 RS HIGHER THAN WOULD BE APPLICABLE ACCORDING TO THE GEOLOGY.
- ROCKSUPPORT ON THE PERIPHERY OF INTERSECTING TUNNEL DEPENDS ON SEQUENCE OF EXCAVATION AND SHALL BE MODIFIED BY THE ENGINEER AT SITE PRIOR APPLYING.

NOTES DRAIN HOLES:

- DRAIN HOLES SHALL BE DRILLED AFTER INSTALLATION OF BOLTS
- DRAIN HOLES L=6.00 m, INCLINED 5°. DIA ϕ 76 mm
- DRAIN HOLE SHALL BE EQUIPPED WITH SUITABLE FILTER PIPES (SLOTTED PVC PIPES WRAPPED WITH GEOTEXTILE)
- PATTERN 9 m² (3.00 BY 3.00).
- DRAIN HOLE PATTERN MAY BE ADJUSTED ON SITE TO SUIT WATER INFLOW FROM PARTICULARLY PERMEABLE ROCK STRATA. DRAIN HOLES IN THE CAVERN VAULT SHALL BE ALIGNED VERTICALLY, TO ALLOW FOR DIRECT CONNECTION OF VERTICAL COLLECTING PIPES.

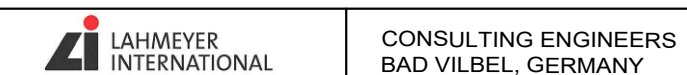
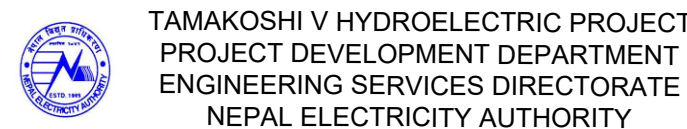
NOTES:

- ALL DIMENSIONS ARE IN METERS [m] UNLESS OTHERWISE NOTED.
- ALL ELEVATIONS ARE IN [masl].
- MONITORING SYSTEM NOT SHOWN ON THIS DRAWING.



Reference Drawings	
Drwg. No.	Title
31-00053-DD-4316-1220...	HEADWORKS, HEADPOND, PLAN AND SECTIONS

Revisions			
	Name	Date	Notes



TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

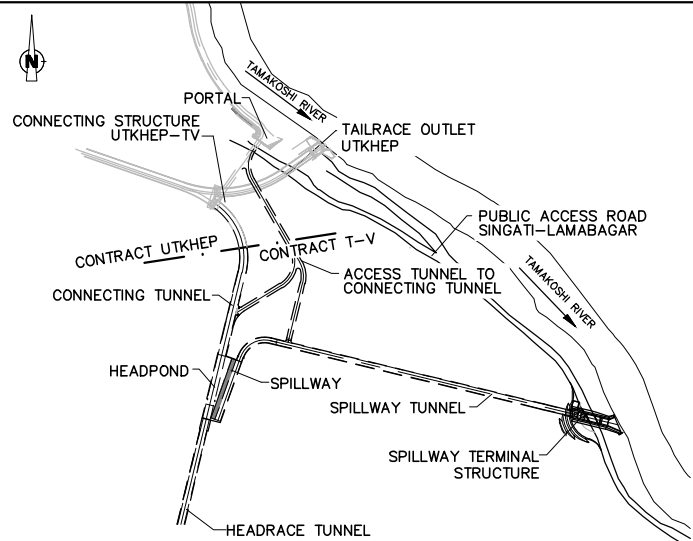
	Name	Date	DETAILED DESIGN		
Prepared	R. Shrivastava	27.09.18	<u>HEADWORKS</u> <u>HEADPOND</u> CROSS SECTIONS DS WALL ROCK SUPPORT PROJECT DRAWING		
Drawn	A. K. Basu	27.09.18			
Checked	Roloff	27.09.18			
Approved	Dr. Moeller	27.09.18			
Replaces Drwg. No: 31-00053-DD-4316-Y-0000_—					
CAD— File No.:					
Scale A3: 1:200			Drwg. No.: 31-00053-DD-4316—	S 1226	REV. :

NOTES:

1. ALL DIMENSIONS ARE IN METERS [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE IN [masl].

NOTES TO INSTRUMENTATION:

1. EACH EXTENSOMETER HEAD SHALL BE EQUIPPED WITH A GEODETIC SURVEY POINT.
2. TENDONS IF INSTALLED SHALL BE EQUIPPED WITH A LOAD CELL.
3. LOAD CELLS SHALL BE INSTALLED ON ANCHORS THAT ARE AT AS INDICATED OR NEAR THE MONITORING SECTIONS.
4. IF NICHES PROVIDED FOR EXTENSOMETER AT FACE WALLS THOSE SHALL BE EQUIPPED WITH A BEACON TO ALLOW GEODETIC SURVEY.
5. CONVERGENCY SECTIONS AT INTERSECTING TUNNELS SHALL BE LOCATED AT 2 m DISTANCE FROM HEADPOND WALL.



KEYPLAN – HEADWORKS

Reference Drawings

Drwg. No.	Title
31-00053-DD-4316-Q-1220	HEADWORKS, HEADPOND, PLAN AND SECTIONS

Revisions	Name	Date	Notes



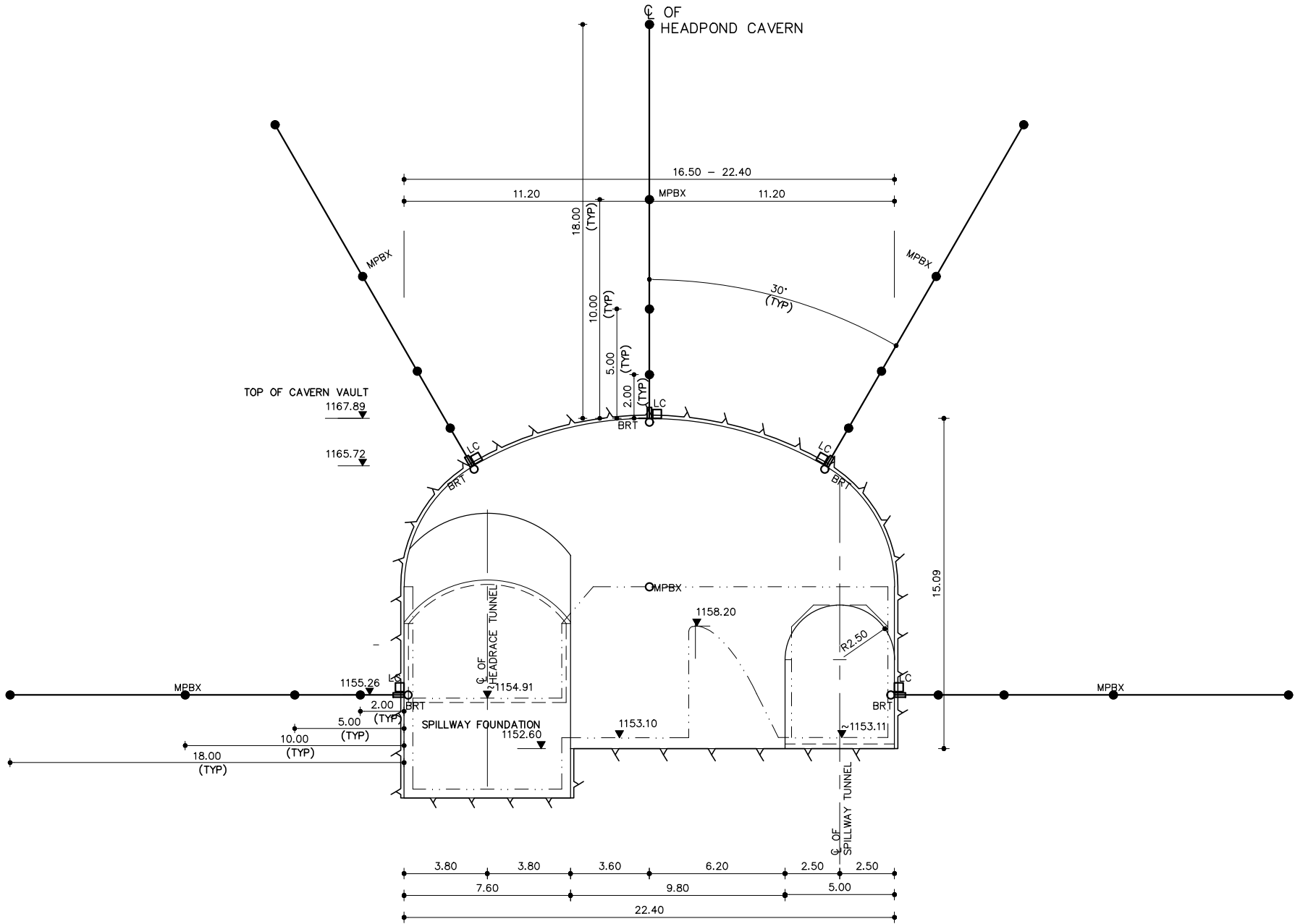
TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY



CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT
DETAILED ENGINEERING DESIGN

Name	Date	DETAILLED DESIGN
Prepared R. Shrivastava	27.09.18	HEADWORKS HEADPOND CROSS SECTION 1 US WALL INSTRUMENTATION PROJECT DRAWING
Drawn A. K. Basu	27.09.18	
Checked Roloff	27.09.18	
Approved Dr. Moeller	27.09.18	
Replaces Drwg. No: 31-00053-DD-4316-Y-0000_		
CAD- File No.:		
Scale A3: 1:250	Drwg. No.: 31-00053-DD-4316- S 1228	REV. —



SECTION 1-1
HEADPOND US WALL AND CAVERN
SCALE 1:250

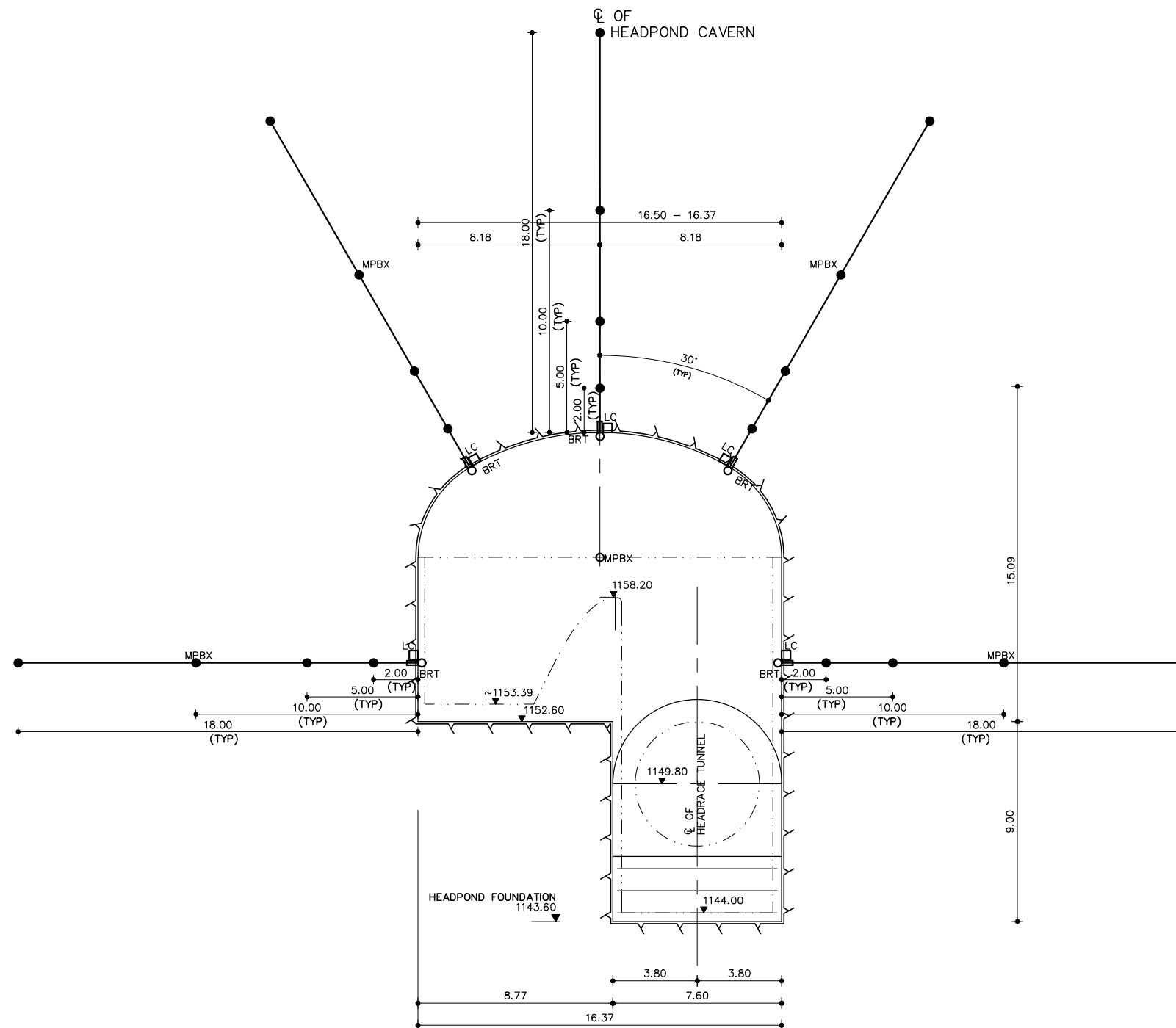
LEGEND:

- MULTI-POINT BOREHOLE EXTENSOMETER
- ANCHOR LOAD CELL
- BRT (BI-REFLEX-TARGET)
-

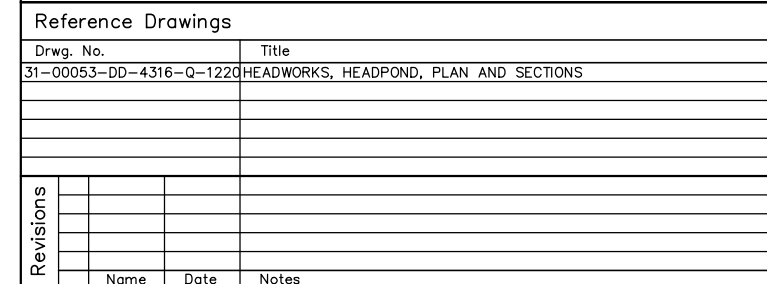
DRAFT STATUS:
27.09.2018


1. ALL DIMENSIONS ARE IN METERS [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE IN [masl].

1. EACH EXTENSOMETER HEAD SHALL BE EQUIPPED WITH A GEODETIC SURVEY POINT.
2. TENDONS IF INSTALLED SHALL BE EQUIPPED WITH A LOAD CELL.
3. LOAD CELLS SHALL BE INSTALLED ON ANCHORS THAT ARE AT AS INDICATED OR NEAR THE MONITORING SECTIONS.
4. IF NICHES PROVIDED FOR EXTENSOMETER AT FACE WALLS THOSE SHALL BE EQUIPPED WITH A BEACON TO ALLOW GEODETIC SURVEY.
5. CONVERGENCY SECTIONS AT INTERSECTING TUNNELS SHALL BE LOCATED AT 2 m DISTANCE FROM HEADPOND WALL.



DRAFT STATUS:
27.09.2018



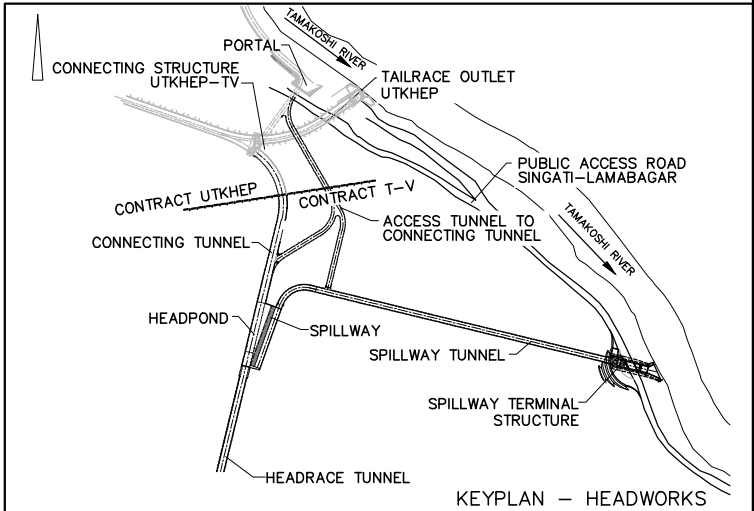
 LAHMEYER INTERNATIONAL	CONSULTING ENGINEERS BAD VILBEL, GERMANY
---	---

	Name	Date	DETAILED DESIGN	
Prepared	R. Shrivastava	27.09.18	<u>HEADWORKS</u> <u>HEADPOND</u> CROSS SECTION 2 DS WALL INSTRUMENTATION PROJECT DRAWING	
Drawn	A. K. Basu	27.09.18		
Checked	Roloff	27.09.18		
Approved	Dr. Moeller	27.09.18		
Replaces Drwg. No: 31-00053-DD-4316-Y-0000_—				
CAD— File No.:				
Scale A3: 1:250			Drwg. No.: 31-00053-DD-4316— S 1229 REV. —	

NOTES:

1. ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. EXTERNAL DIMENSIONS REFER TO THE SHOTCRETE LINE = THE CLEAR PROFILE OF THE STRUCTURE. THE EXCAVATION LINE HAS TO BE ADJUSTED ACCORDING TO THE ACTUAL GEOLOGICAL CONDITIONS.
4. ALL SHOTCRETE SHALL BE PLAIN SHOTCRETE WITH WIREMESH AS ASSIGNED TO ROCK SUPPORT CLASS.

DRAFT STATUS:
11.10.2018



Reference Drawings

Drwg. No.	Title
31-00053-DD-4310-Q1200	HEADWORK STRUCTURES - LAYOUT
31-00053-DD-4244-Q1231	SPILLWAY TUNNEL- LONGITUDINAL AND CROSS SECTION

Revisions	Name	Date	Notes



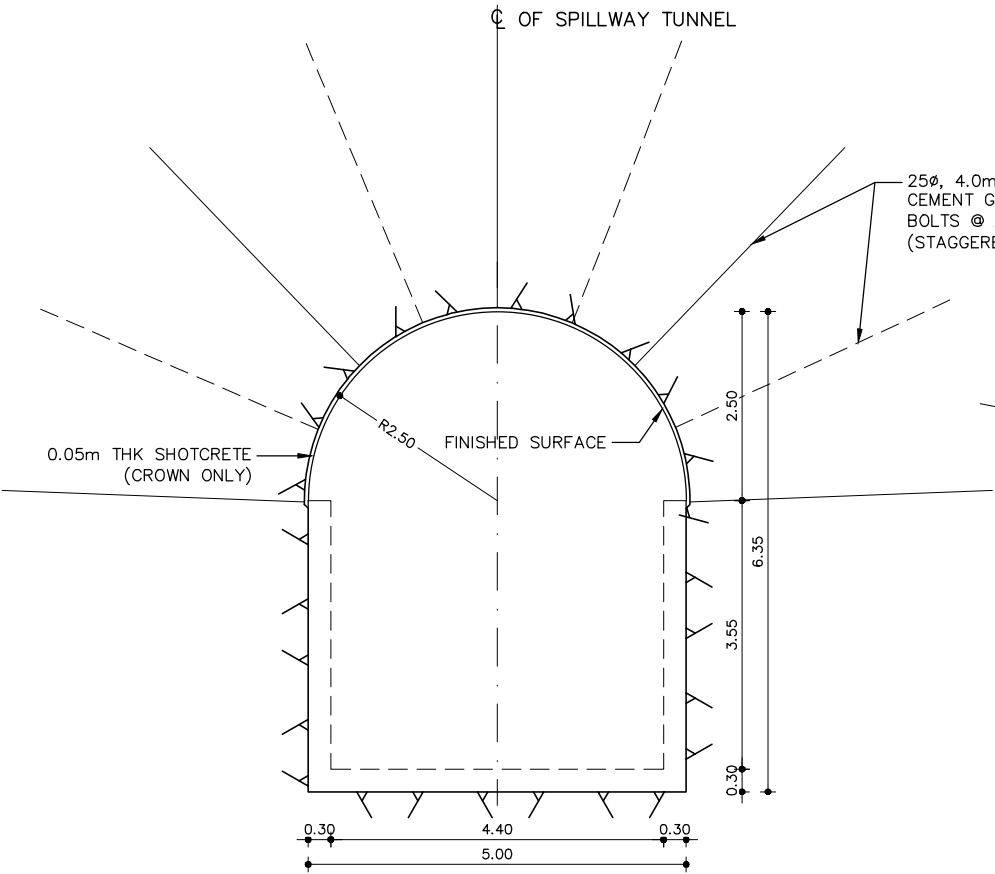
TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY



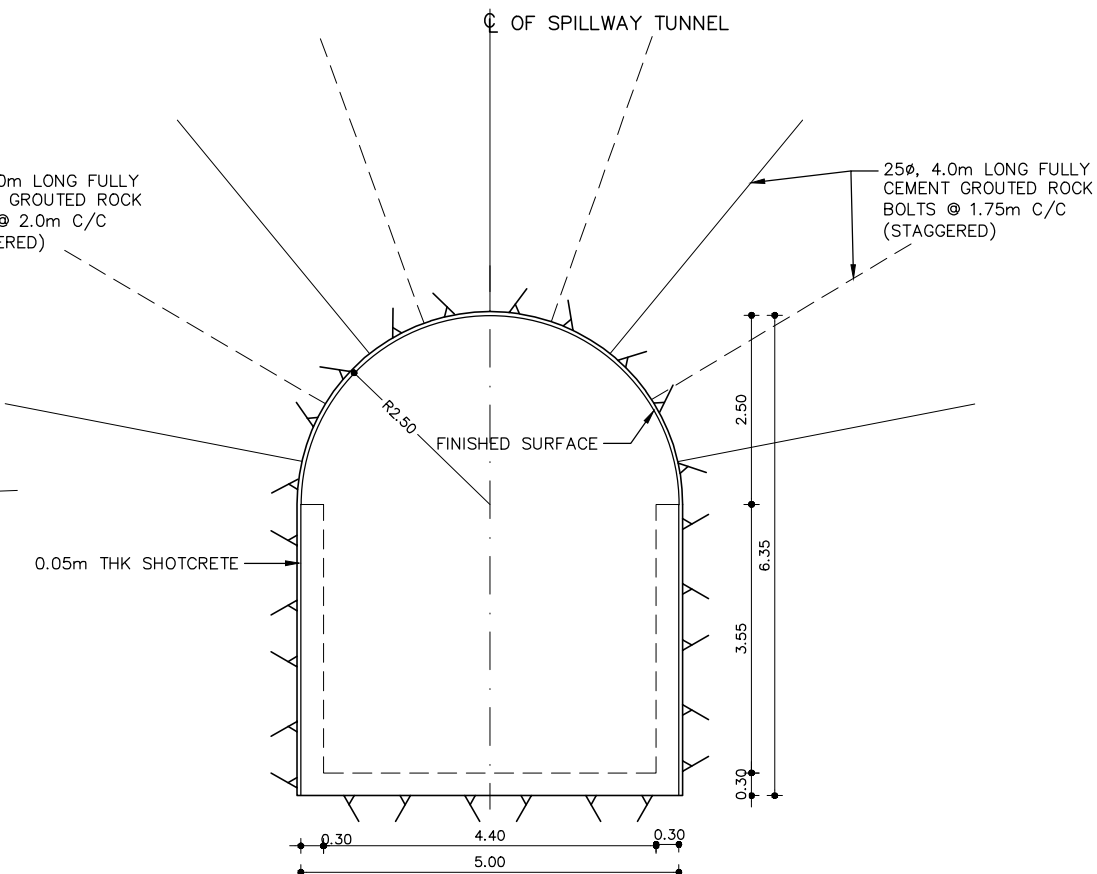
CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT
DETAILED ENGINEERING DESIGN

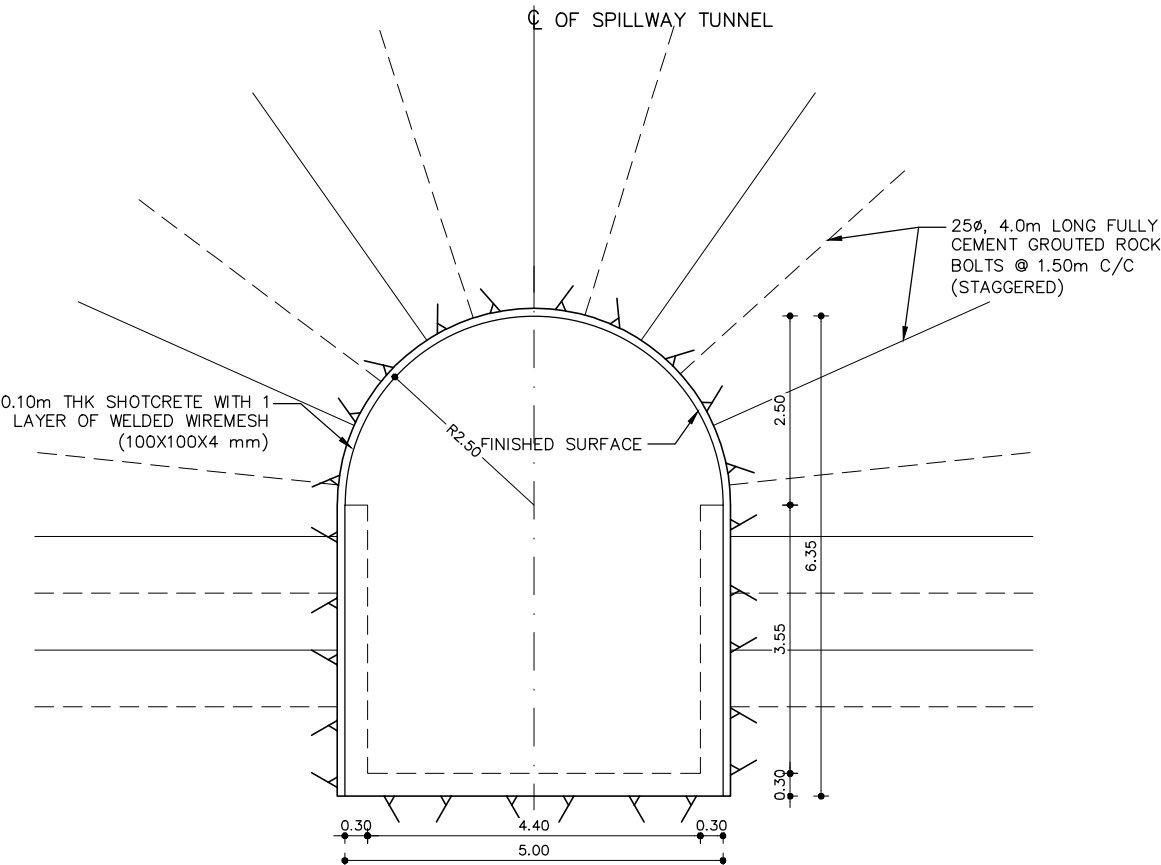
Name	Date	DETAILLED DESIGN
Prepared R. Shrivastava	27.09.18	HEADWORKS
Drawn A. K. Basu	27.09.18	SPILLWAY TUNNEL
Checked Roloff	27.09.18	EXCAVATION AND
Approved Dr. Moeller	27.09.18	ROCK SUPPORT
Replaces Drwg. No:		SHEET 1 OF 2
CAD- File No.:		PROJECT DRAWING
Scale A3: 1:100		Drwg. No.: 31-00053-DD-4244-S 1235 REV. -



TYPICAL DETAILS OF SUPPORT SYSTEM FOR ROCK CLASS II
SCALE 1:100



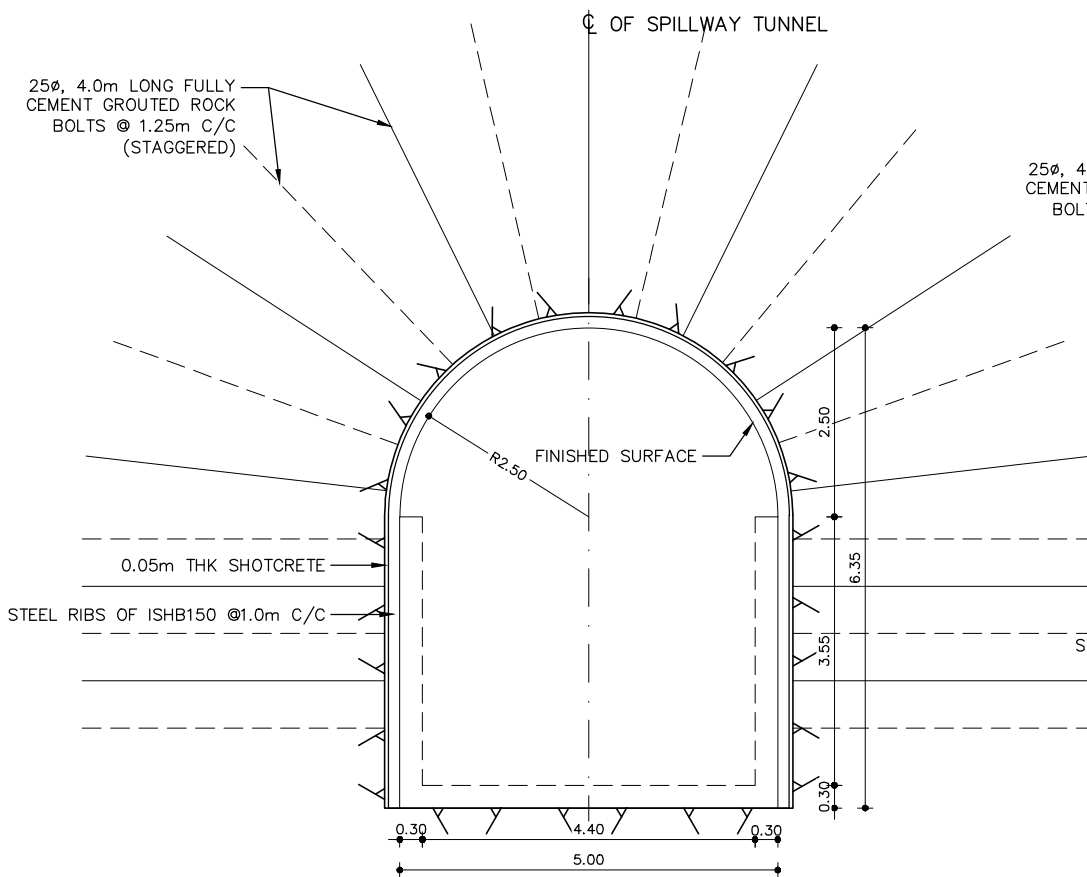
TYPICAL DETAILS OF SUPPORT SYSTEM FOR ROCK CLASS III
SCALE 1:100



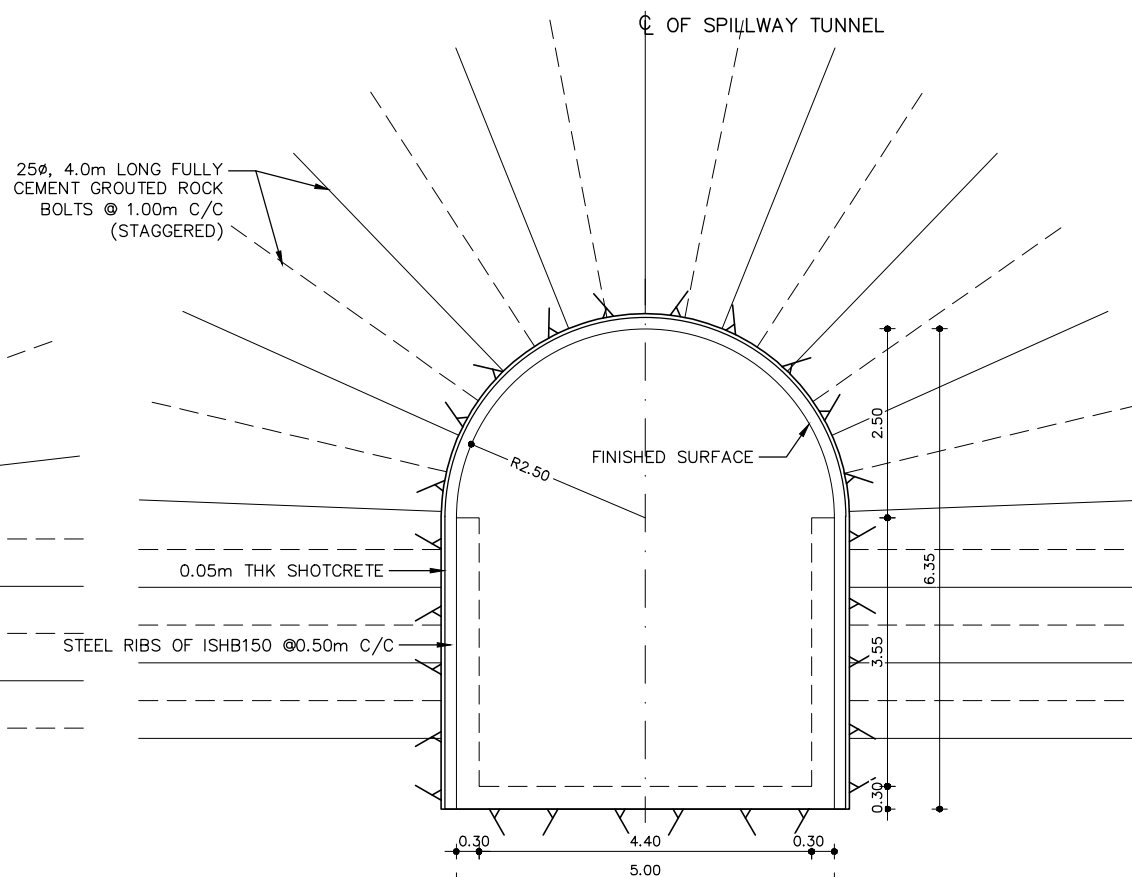
TYPICAL DETAILS OF SUPPORT SYSTEM FOR ROCK CLASS IV
SCALE 1:100

NOTES TO ROCK SUPPORT:

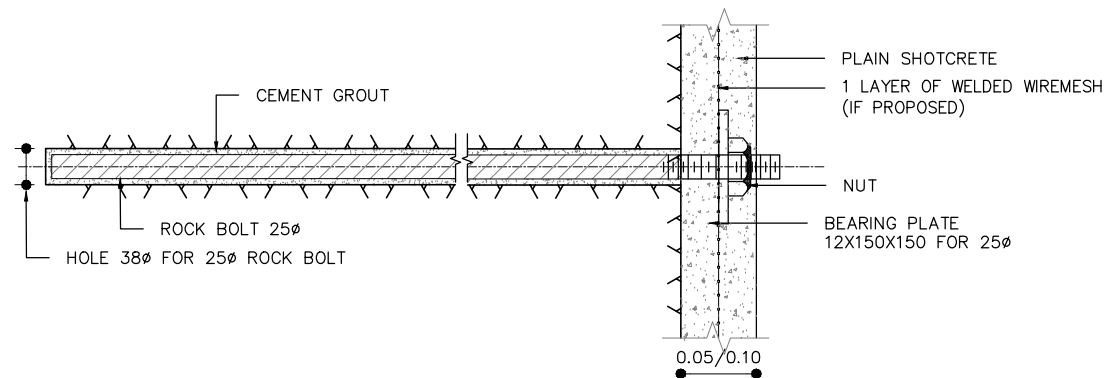
1. ROCK BOLTS SHALL HAVE THE FOLLOWING CHARACTERISTICS:
 - DIA. 25 MM
 - YIELD STRENGTH 500 N/MM²
 - MAXIMUM TENSILE CAPACITY 213 KN
2. THE SHOTCRETE MIX SHALL HAVE 28 DAYS OF COMPRESSIVE STRENGTH OF 35MPa.
3. STEEL RIBS SHALL CONFORM TO IS:226-1975.
4. AN ADDITIONAL LAYER OF 50MM THK PLAIN SHOTCRETE SHALL BE APPLIED ON THE EXPOSED PARTS OF STEEL RIBS FOR PROTECTION AGAINST CORROSION.
5. ROCK SUPPORT MEASURES SHOWN ON THIS DRAWING ARE PRELIMINARY ONLY. FINAL ARRANGEMENT OF ROCK SUPPORT (SHOTCRETE THICKNESSES; LENGTH, ORIENTATION AND GRID OF ROCK BOLTS) HAVE TO BE ADOPTED TO ACTUAL GEOTECHNICAL CONDITIONS, SUBJECT TO AGREEMENT BETWEEN OWNER AND CONTRACTOR.
6. THE APPLICATION OF ROCK SUPPORT CLASSES (RSC) DEPENDS ON THE ACTUALLY ENCOUNTERED CONDITIONS AND GEOTECHNICAL MONITORING AND SHALL BE DECIDED BY THE RESPONSIBLE SECTION ENGINEER/GEOLOGIST.
7. CONTOUR BLASTING HAS TO BE DONE SMOOTHLY WITH MINIMUM DAMAGE TO THE REMAINING ROCKMASS AND AVOIDING OVERBREAKS AS MUCH AS POSSIBLE.
8. BOLT ORIENTATION SHALL BE ADAPTED TO ENCOUNTERED REQUIREMENTS, INSTALLED PERPENDICULAR TO THE ADIT PROFILE, IF DEVIATION FROM VERTICALITY REQUIRED SHALL BE RESTRICTED BELOW 30°.
9. IN AREA WITH LARGE WATER INFLOW (SO THAT FULLY GROUTED-BOLT CANNOT BE PLACED) SWELLEX ANCHORS OF CORRESPONDING ARRANGEMENT COULD BE USED INSTEAD OF TEMPORARY SUPPORT UNTIL THE WATER INFLOW IS REDUCED TO A LEVEL THAT ALLOWS SHOTCRETING AND PLACEMENT BY FULLY GROUTED-BOLTS.
10. DRIPPING OR FLOWING WATER HAS TO BE COLLECTED IN PIPES BEFORE SHOTCRETING SPECIAL DRAIN HOLES MAY BE REQUIRED (USE SWELLEX BOLT).
11. CONDITIONAL FOREPOLING FOR Q-VALUES <0.10, FOREPOLING UMBRELLA SHALL ADOPT AS PER MIN.: Ø25 FULLY GROUTED STEEL BARS, 6m EMBEDDED, 2.0m OVERLAP, 300mm SPACING, 10° ANGLE



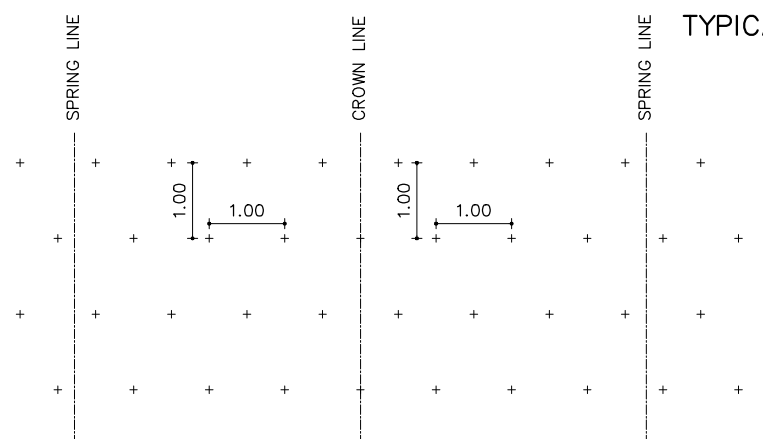
SPILLWAY TUNNEL
TYPICAL DETAILS OF SUPPORT SYSTEM FOR ROCK CLASS V
SCALE 1:100



SPILLWAY TUNNEL
TYPICAL DETAILS OF SUPPORT SYSTEM FOR ROCK CLASS VI
SCALE 1:100



TYPICAL ROCK BOLT AND SHOTCRETE DETAILS
NOT TO SCALE



TYPICAL DETAILS OF ROCK BOLTS IN CROWN
FOR ROCK CLASS VI
(DEVELOPED VIEW)
NOT TO SCALE

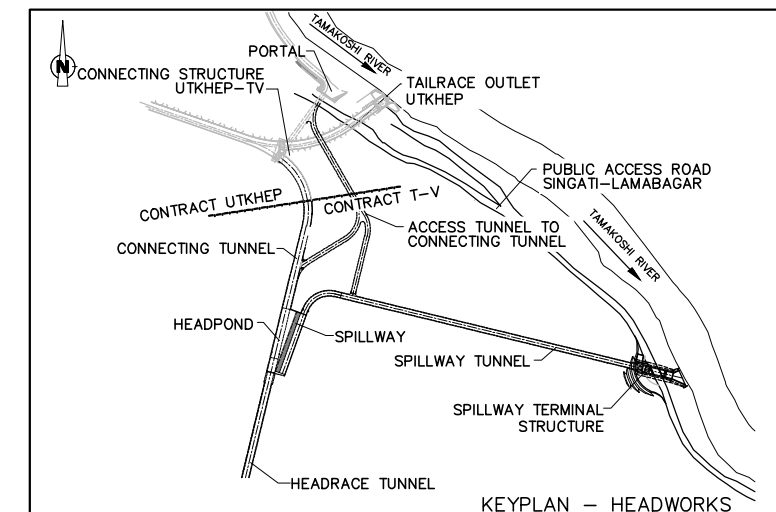
NOTES TO ROCK SUPPORT:

- ROCK BOLTS SHALL HAVE THE FOLLOWING CHARACTERISTICS:
 - DIA. 25 MM
 - YIELD STRENGTH 500 N/MM²
 - MAXIMUM TENSILE CAPACITY 213 KN
- THE SHOTCRETE MIX SHALL HAVE 28 DAYS OF COMPRESSIVE STRENGTH OF 35MPa.
- STEEL RIBS SHALL CONFORM TO IS:226-1975.
- AN ADDITIONAL LAYER OF 50MM THK PLAIN SHOTCRETE SHALL BE APPLIED ON THE EXPOSED PARTS OF STEEL RIBS FOR PROTECTION AGAINST CORROSION.
- ROCK SUPPORT MEASURES SHOWN ON THIS DRAWING ARE PRELIMINARY ONLY. FINAL ARRANGEMENT OF ROCK SUPPORT (SHOTCRETE THICKNESSES; LENGTH, ORIENTATION AND GRID OF ROCK BOLTS) HAVE TO BE ADOPTED TO ACTUAL GEOTECHNICAL CONDITIONS, SUBJECT TO AGREEMENT BETWEEN OWNER AND CONTRACTOR.
- THE APPLICATION OF ROCK SUPPORT CLASSES (RSC) DEPENDS ON THE ACTUALLY ENCOUNTERED CONDITIONS AND GEOTECHNICAL MONITORING AND SHALL BE DECIDED BY THE RESPONSIBLE SECTION ENGINEER/GEOLOGIST.
- CONTOUR BLASTING HAS TO BE DONE SMOOTHLY WITH MINIMUM DAMAGE TO THE REMAINING ROCKMASS AND AVOIDING OVERBREAKS AS MUCH AS POSSIBLE.
- BOLT ORIENTATION SHALL BE ADAPTED TO ENCOUNTERED REQUIREMENTS, INSTALLED PERPENDICULAR TO THE ADIT PROFILE, IF DEVIATION FROM VERTICALITY REQUIRED SHALL BE RESTRICTED BELOW 30°.
- IN AREA WITH LARGE WATER INFLOW (SO THAT FULLY GROUTED-BOLT CANNOT BE PLACED) SWELLEX ANCHORS OF CORRESPONDING ARRANGEMENT COULD BE USED INSTEAD OF TEMPORARY SUPPORT UNTIL THE WATER INFLOW IS REDUCED TO A LEVEL THAT ALLOWS SHOTCRETING AND PLACEMENT BY FULLY GROUTED-BOLTS.
- DIPPING OR FLOWING WATER HAS TO BE COLLECTED IN PIPES BEFORE SHOTCRETING SPECIAL DRAIN HOLES MAY BE REQUIRED (USE SWELLEX BOLT).
- CONDITIONAL FOREPOLING FOR Q-VALUES <0.10, FOREPOLING UMBRELLA SHALL ADOPT AS PER MIN.: Ø25 FULLY GROUTED STEEL BARS, 6m EMBEDDED, 2.0m OVERLAP, 300mm SPACING, 10° ANGLE

NOTES:

- ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
- ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
- EXTERNAL DIMENSIONS REFER TO THE SHOTCRETE LINE = THE CLEAR PROFILE OF THE STRUCTURE. THE EXCAVATION LINE HAS TO BE ADJUSTED ACCORDING TO THE ACTUAL GEOLOGICAL CONDITIONS.
- ALL SHOTCRETE SHALL BE PLAIN SHOTCRETE WITH WIREMESH AS ASSIGNED TO ROCK SUPPORT CLASS.

DRAFT STATUS:
11.10.2018



Reference Drawings

Drwg. No.	Title
31-00053-DD-4310-Q1200	HEADWORK STRUCTURES - LAYOUT
31-00053-DD-4310-Q1201	SPILLWAY TUNNEL- LONGITUDINAL AND CROSS SECTION

Revisions	Name	Date	Notes



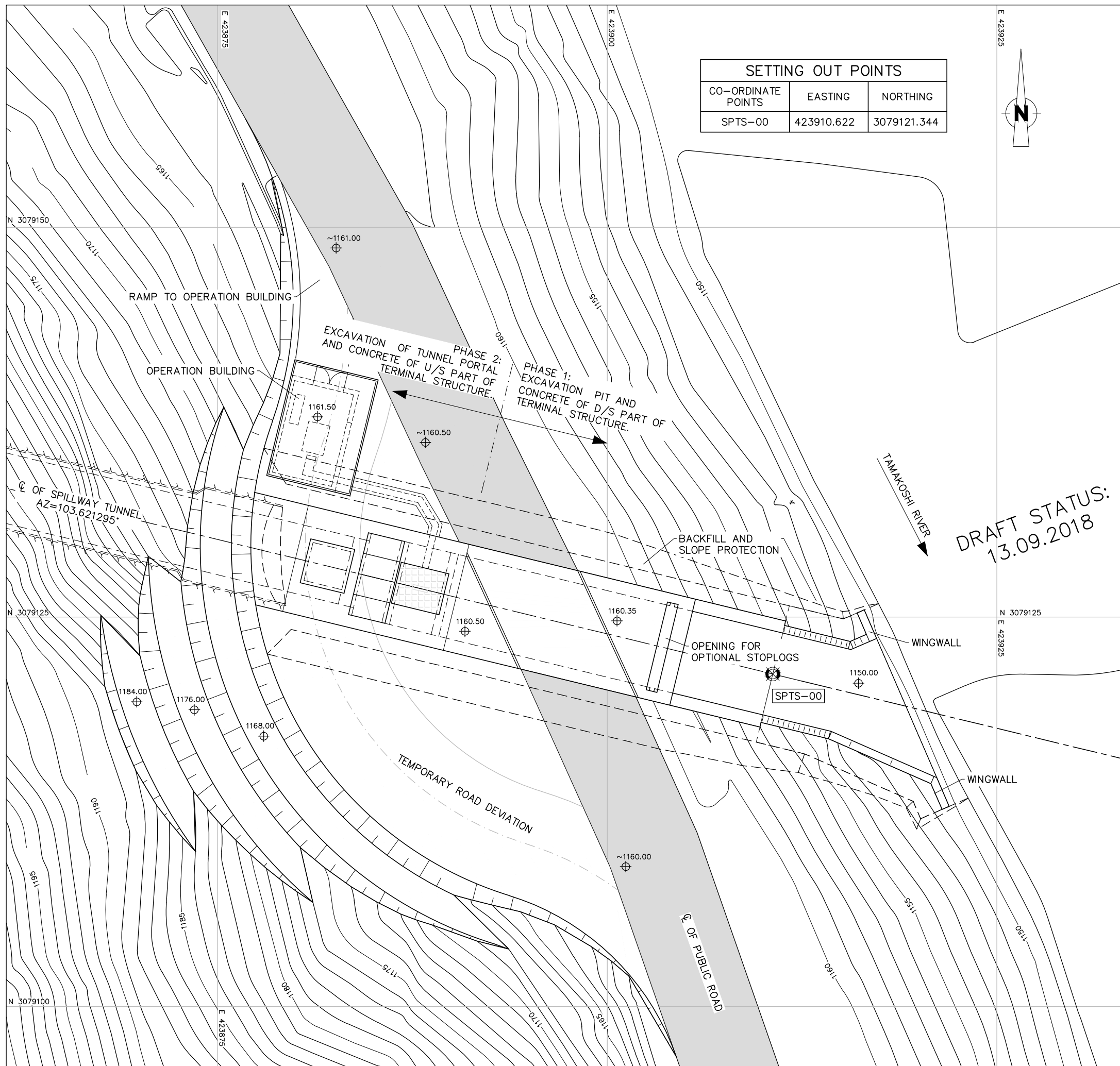
TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY



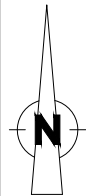
CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

Name	Date	DETAILLED DESIGN
Prepared R. Shrivastava	27.09.18	HEADWORKS SPILLWAY TUNNEL EXCAVATION AND ROCK SUPPORT SHEET 2 OF 2 PROJECT DRAWING
Drawn A. K. Basu	27.09.18	
Checked Roloff	27.09.18	
Approved Dr. Moeller	27.09.18	
Replaces Drwg. No:		
CAD- File No.:		
Scale A3: 1:100		Drwg. No.: 31-00053-DD-4244-S 1235 REV. —



SETTING OUT POINTS		
CO-ORDINATE POINTS	EASTING	NORTHING
SPTS-00	423910.622	3079121.344



NOTES:

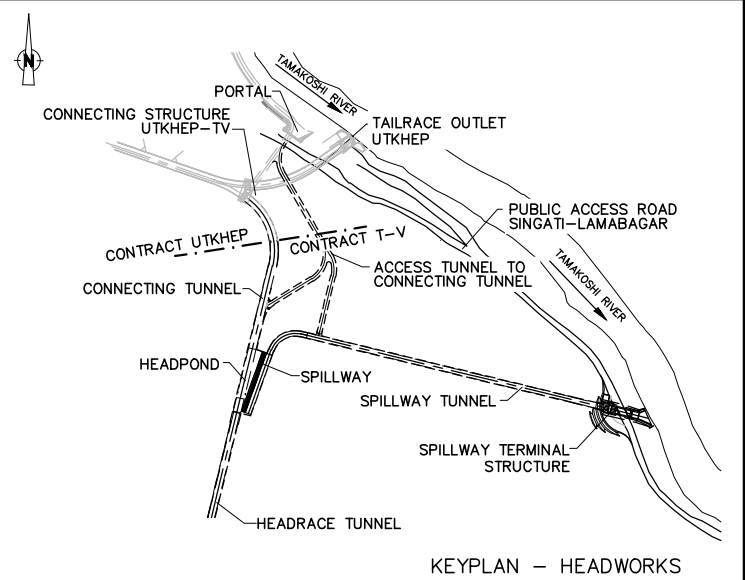
1. ALL DIMENSIONS ARE IN METERS [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. CO-ORDINATES BASED ON NATIONAL GEODETIC NETWORK SYSTEM (EVEREST 1830).

LEGEND:

- AZ AZIMUTH [°]
E ELEVATION
F FIX POINT
- CONCRETE CLASS C1 – CONCRETE C25/30
CONCRETE CLASS F – BLINDING CONCRETE C12/15
- CONSTRUCTION JOINTS
- UNFINISHED TOP OF SLAB
FINISHED FLOOR LEVEL



DRAFT STATUS:
13.09.2018



Reference Drawings	
Drwg. No.	Title
31-00053-DD-4310-Q1200	HEADWORK STRUCTURES – LAYOUT
31-00053-DD-4310-Q1201	HEADWORK STRUCTURES – TUNNEL SYSTEM – DETAILED LAYOUT

Revisions			
	Name	Date	Notes

TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY

LAHMEYER
INTERNATIONAL

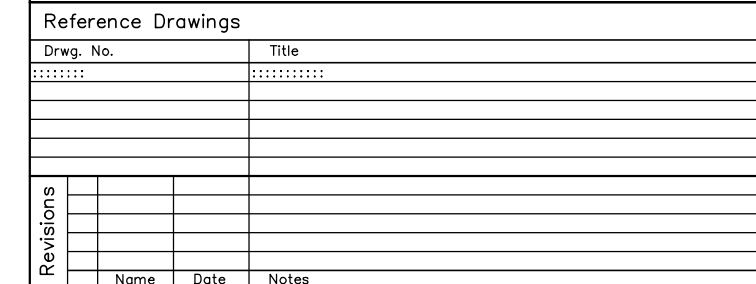
CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT
DETAILED ENGINEERING DESIGN


Prepared	Name	Date	DETAILED DESIGN HEADWORKS SPILLWAY TERMINAL STRUCTURE PLAN PROJECT DRAWING
Drawn	B. Khadka	31.07.17	
Checked	Roloff		
Approved	Dr. Moeller		
Replaces Drwg. No: 31-00053-DD-4245-Y-0000_			
CAD- File No.:			
Scale A3: 1:250			Drwg. No.: 31-00053-DD-4245- Q 1240 REV. -


1. ALL DIMENSIONS ARE IN METERS [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. CO-ORDINATES BASED ON NATIONAL GEODETIC NETWORK SYSTEM (EVEREST 1830).

AZ	AZIMUTH [°]
	ELEVATION
	FIX POINT



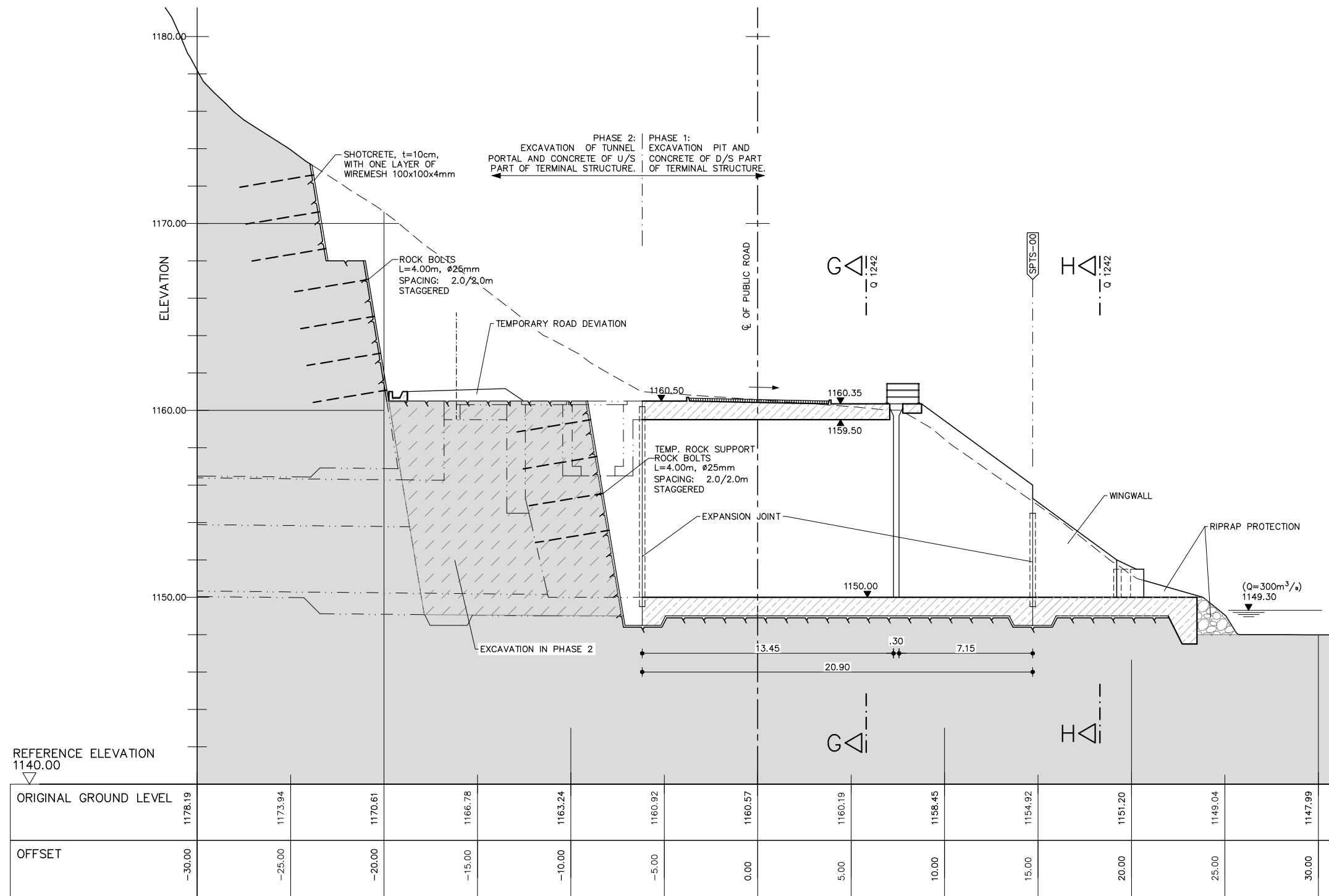
DRAFT STATUS:
13.09.2018

 TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY

 LAHMEYER INTERNATIONAL	CONSULTING ENGINEERS BAD VILBEL, GERMANY
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TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

	Name	Date	DETAILED DESIGN <u>HEADWORKS</u> <u>SPILLWAY TERMINAL</u> <u>STRUCTURE</u> HORIZONTAL SECTION, SECTION A-A, B-B PROJECT DRAWING	
Prepared	B. Khadka	31.07.17		
Drawn	B. Khadka			
Checked	Roloff			
Approved	Dr. Moeller			
Replaces Dwg. No: 31-00053-DD-4245-Y-0000_				
CAD- File No.:				
Scale A3:	1:250	Dwg. No.: 31-00053-DD-4245-	Q 1242	REV. -

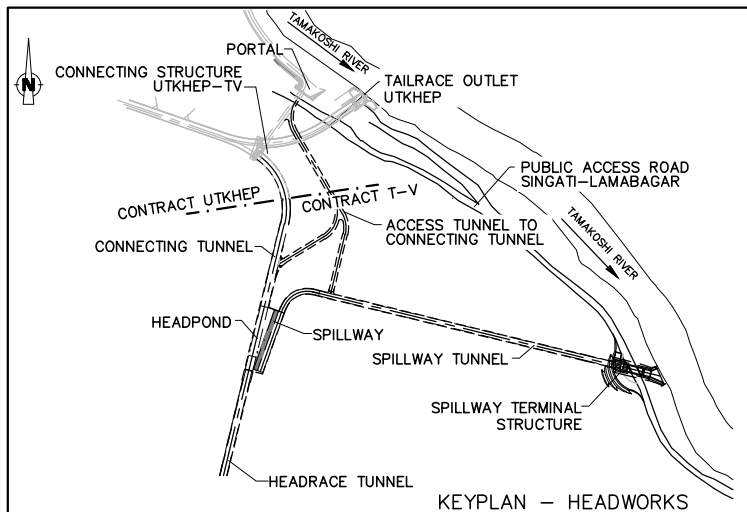
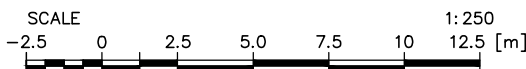


NOTES:

- ALL DIMENSIONS ARE IN METERS [m] UNLESS OTHERWISE NOTED.
- ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
- CO-ORDINATES BASED ON NATIONAL GEODETIC NETWORK SYSTEM (EVEREST 1830).

LEGEND:

- AZ AZIMUTH [°]
E ELEVATION
F FIX POINT
- CONCRETE CLASS C1 – CONCRETE C25/30
CONCRETE CLASS F – BLINDING CONCRETE C12/15
- CONSTRUCTION JOINTS
- UNFINISHED TOP OF SLAB
FINISHED FLOOR LEVEL



Reference Drawings

Drwg. No.	Title
31-00053-DD-4310-Q1200	HEADWORK STRUCTURES – LAYOUT
31-00053-DD-4310-Q1201	HEADWORK STRUCTURES – TUNNEL SYSTEM – DETAILED LAYOUT

Revisions	Name	Date	Notes



TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY

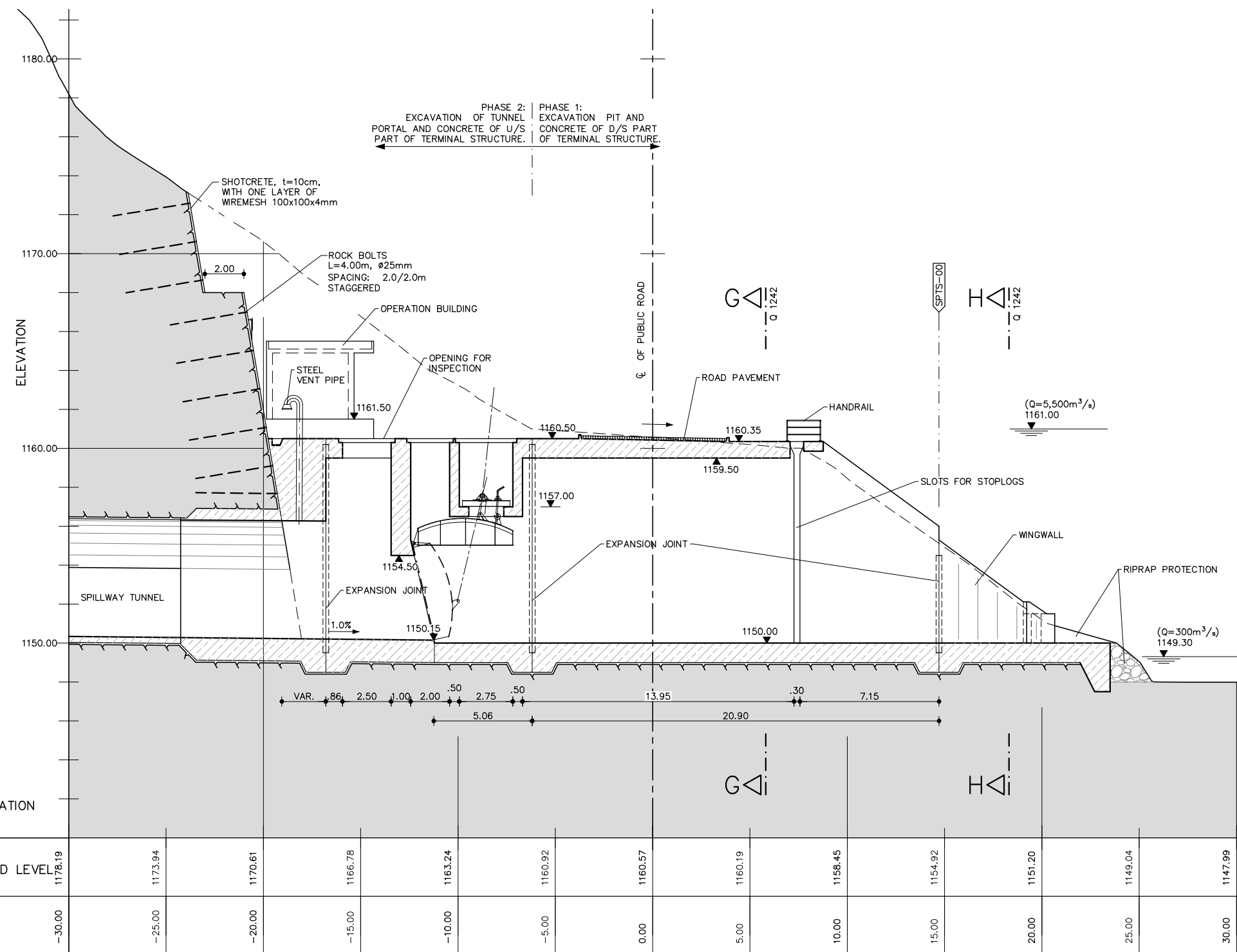


CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT
DETAILED ENGINEERING DESIGN

Name	Date	DETAILLED DESIGN
Prepared B. Khadka	31.07.17	HEADWORKS
Drawn B. Khadka		SPILLWAY TERMINAL STRUCTURE
Checked Roloff		SECTION 1-1 (PHASE 1)
Approved Dr. Moeller		PROJECT DRAWING
Replaces Drwg. No: 31-00053-DD-4245-Y-0000_		
CAD- File No.:		
Scale A3: 1: 250	Drwg. No.: 31-00053-DD-4245-Q 1243	REV. -

DRAFT STATUS:
03.10.2018

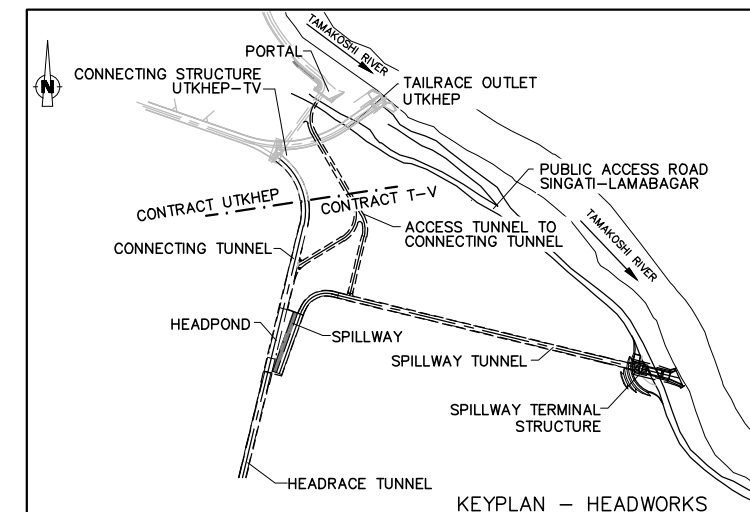


NOTES:

- ALL DIMENSIONS ARE IN METERS [m] UNLESS OTHERWISE NOTED.
- ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
- CO-ORDINATES BASED ON NATIONAL GEODETIC NETWORK SYSTEM (EVEREST 1830).

LEGEND:

- AZ AZIMUTH [°]
E ELEVATION
F FIX POINT
- CONCRETE CLASS C1 - CONCRETE C25/30
CONCRETE CLASS F - BLINDING CONCRETE C12/15
- CONSTRUCTION JOINTS
- UNFINISHED TOP OF SLAB
FINISHED FLOOR LEVEL



Reference Drawings

Drwg. No.	Title
31-00053-DD-4310-Q1200	HEADWORK STRUCTURES - LAYOUT
31-00053-DD-4310-Q1201	HEADWORK STRUCTURES - TUNNEL SYSTEM - DETAILED LAYOUT

Revisions	Name	Date	Notes



TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY



CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

Name	Date	DETAILLED DESIGN
Prepared B. Khadka	31.07.17	HEADWORKS
Drawn B. Khadka		SPILLWAY TERMINAL STRUCTURE
Checked Roloff		SECTION 1-1 (FINAL STAGE)
Approved Dr. Moeller		PROJECT DRAWING
Replaces Drwg. No: 31-00053-DD-4335-Y-0000_-		
CAD- File No.:		
Scale A3: 1:250	Drwg. No.: 31-00053-DD-4245-Q 1244	REV. -

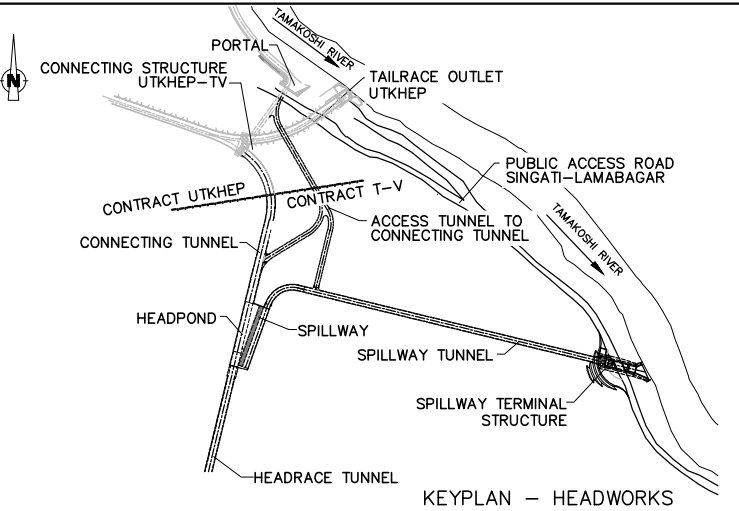
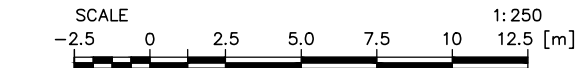
DRAFT STATUS:
03.10.2018

NOTES TO ROCK SUPPORT:

- ROCK BOLTS SHALL HAVE THE FOLLOWING CHARACTERISTICS:
 - DIA. 25 MM
 - YIELD STRENGTH 500 N/MM²
 - MAXIMUM TENSILE CAPACITY 213 KN
- THE SHOTCRETE MIX SHALL HAVE 28 DAYS OF COMPRESSIVE STRENGTH OF 35MPa.
- STEEL RIBS SHALL CONFORM TO IS:226-1975.
- AN ADDITIONAL LAYER OF 50MM THK PLAIN SHOTCRETE SHALL BE APPLIED ON THE EXPOSED PARTS OF STEEL RIBS FOR PROTECTION AGAINST CORROSION.
- ROCK SUPPORT MEASURES SHOWN ON THIS DRAWING ARE PRELIMINARY ONLY. FINAL ARRANGEMENT OF ROCK SUPPORT (SHOTCRETE THICKNESSES; LENGTH, ORIENTATION AND GRID OF ROCK BOLTS) HAVE TO BE ADOPTED TO ACTUAL GEOTECHNICAL CONDITIONS, SUBJECT TO AGREEMENT BETWEEN OWNER AND CONTRACTOR.
- THE APPLICATION OF ROCK SUPPORT CLASSES (RSC) DEPENDS ON THE ACTUALLY ENCOUNTERED CONDITIONS AND GEOTECHNICAL MONITORING AND SHALL BE DECIDED BY THE RESPONSIBLE SECTION ENGINEER/GEOLOGIST.
- CONTOUR BLASTING HAS TO BE DONE SMOOTHLY WITH MINIMUM DAMAGE TO THE REMAINING ROCKMASS AND AVOIDING OVERBREAKS AS MUCH AS POSSIBLE.
- BOLT ORIENTATION SHALL BE ADAPTED TO ENCOUNTERED REQUIREMENTS, INSTALLED PERPENDICULAR TO THE ADIT PROFILE, IF DEVIATION FROM VERTICALITY REQUIRED SHALL BE RESTRICTED BELOW 30°.
- IN AREA WITH LARGE WATER INFLOW (SO THAT FULLY GROUTED-BOLT CANNOT BE PLACED) SWELLEX ANCHORS OF CORRESPONDING ARRANGEMENT COULD BE USED INSTEAD OF TEMPORARY SUPPORT UNTIL THE WATER INFLOW IS REDUCED TO A LEVEL THAT ALLOWS SHOTCRETING AND PLACEMENT BY FULLY GROUTED-BOLTS.
- DRIPPING OR FLOWING WATER HAS TO BE COLLECTED IN PIPES BEFORE SHOTCRETING SPECIAL DRAIN HOLES MAY BE REQUIRED (USE SWELLEX BOLT).
- CONDITIONAL FOREPOLING FOR Q-VALUES <0.10, FOREPOLING UMBRELLA SHALL ADOPT AS PER MIN.: Ø25 FULLY GROUTED STEEL BARS, 6m EMBEDDED, 2.0m OVERLAP, 300mm SPACING, 10° ANGLE


NOTES:

- ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
- ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
- EXTERNAL DIMENSIONS REFER TO THE SHOTCRETE LINE = THE CLEAR PROFILE OF THE STRUCTURE. THE EXCAVATION LINE HAS TO BE ADJUSTED ACCORDING TO THE ACTUAL GEOLOGICAL CONDITIONS.
- ALL SHOTCRETE SHALL BE PLAIN SHOTCRETE WITH WIREMESH AS ASSIGNED TO ROCK SUPPORT CLASS.
- SLOPE OF ROCK EXCAVATION WILL DEPEND ON GEOLOGICAL CONDITION AS ENCOUNTERED DURING EXCAVATION AND MAY DEVIATE FROM THE SLOPE AS INDICATED.



Reference Drawings	
Drwg. No.	Title
31-00053-DD-4310-Q1200	HEADWORK STRUCTURES - LAYOUT
31-00053-DD-4310-Q1201	HEADWORK STRUCTURES - TUNNEL SYSTEM - DETAILED LAYOUT

Revisions			
	Name	Date	Notes



TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY

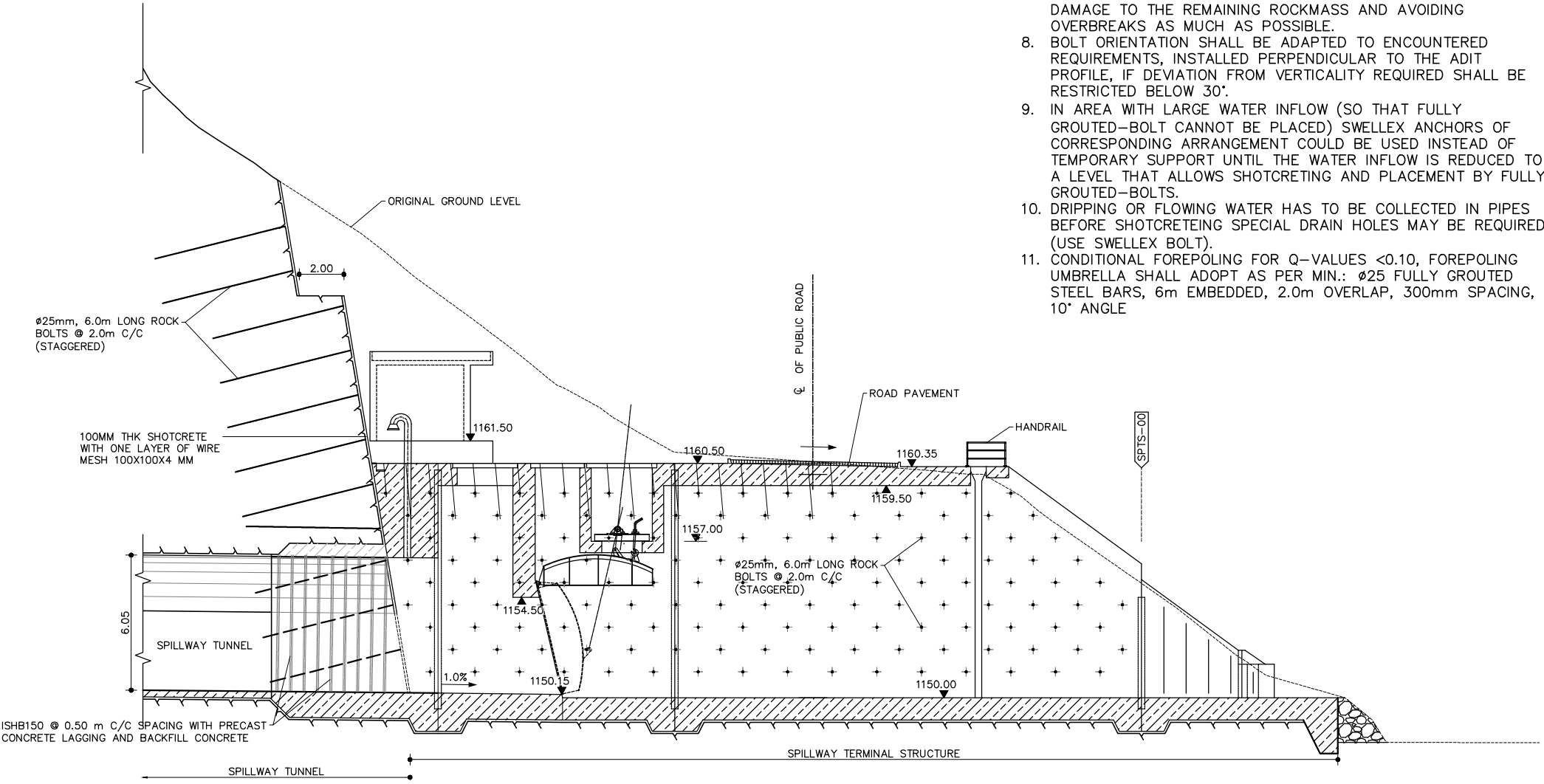


LAHMEYER INTERNATIONAL

CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT
DETAILED ENGINEERING DESIGN

	Name	Date	DETAILED DESIGN		
Prepared	R. Shrivastava	31.07.17	<u>HEADWORKS</u> <u>SPILLWAY TERMINAL STRUCTURE</u> EXCAVATION AND ROCK SUPPORT SHEET 1 OF 2 PROJECT DRAWING		
Drawn	A. K. Basu				
Checked	Roloff				
Approved	Dr. Moeller				
Replaces Drwg. No: 31-00053-DD-4335-Y-0000_					
CAD- File No.:					
Scale A3: 1:250			Drwg. No.: 31-00053-DD-4245-Q 1245		
			REV.	-	



SPILLWAY TERMINAL STRUCTURE
SCALE 1:250

DRAFT STATUS:
11.10.2018